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Work of the High-level Group for the Modernization of Statistical Production and Services

Common Statistical Production Architecture

Prepared by the High-Level Group for the Modernization of Statistical Production and Services[1]

Summary

This paper describes the Common Statistical Production Architecture, prepared under the High-level Group for the Modernization of Statistical Production and Services. The aim of the common architecture is to facilitate standardisation of the components of statistical production, regardless of where these components originate. It provides a framework, principles, processes and guidelines to help reduce the cost of developing and maintaining statistical processes and systems, and improving the responsiveness of the development cycle.

The document is submitted to the Conference of European Statisticians for information.

[1] The present document was submitted late due to resources constraints.

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I. The problem statement

1. Many statistical organizations are facing common challenges. There are two major threats to the continued efficient and effective supply of core statistics that come from within statistical organizations. These are:

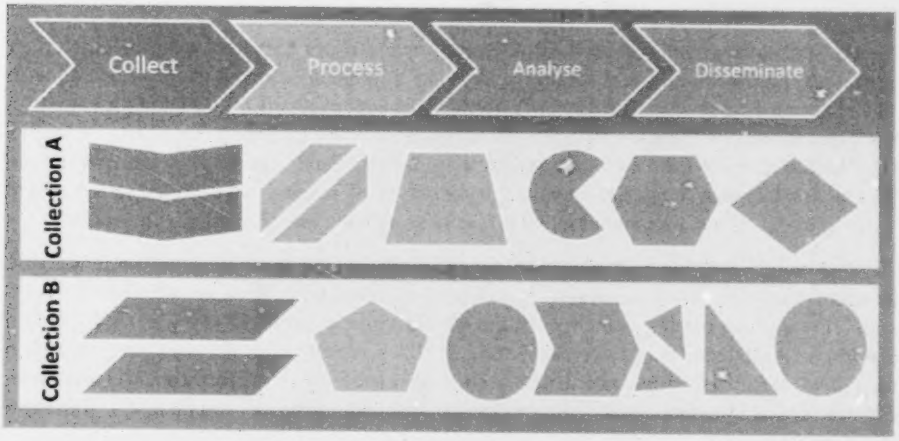
(a) rigid processes and methods, and

(b) inflexible ageing technology environments

2. Over the years, through many iterations and technology changes, statistical organizations have built up their organizational structure, production process, enabling statistical infrastructure, and technology. The cost of maintaining this business model and the associated asset bases (process, statistical, technology) is becoming insurmountable and the model of delivery is not sustainable.

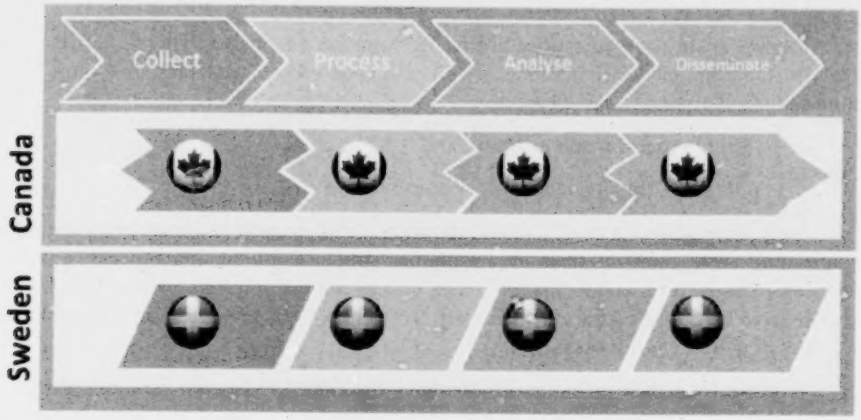
3. Historically, statistical organizations have developed their own business processes and IT-systems for producing statistical products. Therefore, although the products and the processes conceptually are very similar, the individual solutions are not (as represented by the different shapes in Figure 1). Every technical solution was built for a very specific purpose with little regard for ability to share information with other adjacent applications in the statistical cycle and with limited ability to handle similar but slightly different processes and tasks. This can be referred to as 'accidental architecture' as the process and solutions were not designed from a holistic view.

Figure 1
Accidental architectures



4. Often it is difficult to replace even one of the components supporting statistical production. Use of these processes, methods and an inflexible and aging technology environment mean that statistical organizations find it difficult to produce and share between systems data and information aligned to modern standards (for example, Data Documentation Initiative (DDI) and Statistical Data and Metadata eXchange (SDMX)). Process and methodology changes are time consuming and expensive resulting in an inflexible, unresponsive statistical organization.

Figure 2
The result of standardization within an organization

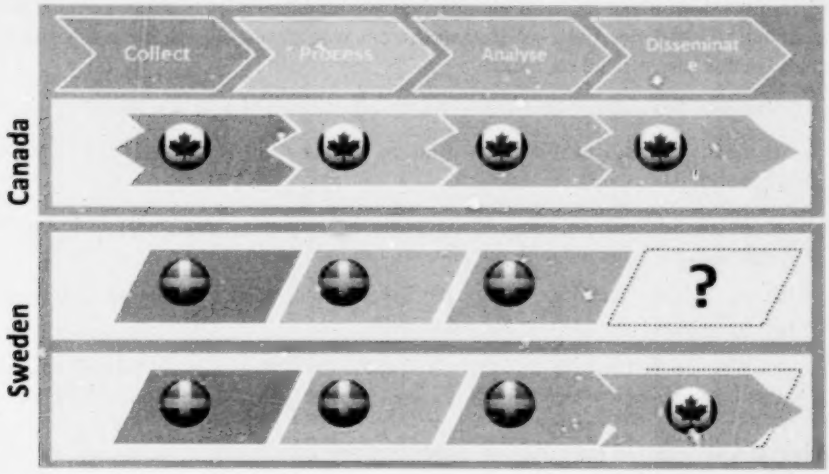


5. Many statistical organizations are modernizing and transforming their organizations using enterprise architecture to underpin their vision and change strategy. An enterprise architecture aims to create an environment which can change and support business goals. It shows what the business needs are, where the organization wants to be, and ensures that the IT strategy aligns with this. Enterprise architecture helps to remove silos, improves collaboration across an organization and ensures that the technology is aligned to the business needs. This work will enable them to standardize their organizations. This is shown in Figure 2 where, as opposed to Figure 1, the countries have standardized their components and interfaces.

6. Statistical organizations have attempted many times over the years to share their processes, methodologies and solutions, as it has long been believed that there is value in this. The mechanism for sharing has historically meant an organization taking a copy of a component and integrating it into their environment. Examples include CANCEIS (CANadian Census Edit and Imputation System) and Banff (an editing and imputation system for business surveys). However, most cases of sharing have involved significant work to integrate the component into a different processing and technology environment.

7. Figure 3 attempts to explain why the difficulty in sharing or reuse occurs. The figure assumes that the two statistical organizations in the figure develop all their business capability and supporting components and interfaces in a standard way (i.e. they have an Enterprise Architecture as shown in Figure 2). Each organization has standardized within their own organization but not in the same way as the other organization. As shown in Figures 2 and 3 where each country has a different shape of component - Canadian components have a zig zag shape and Sweden have components with slanted edges. If Sweden needs a new component, ideally they need a component with a slanted edge. It can be seen in the third row of Figure 3 that while a component from Canada might support the same process and incorporate robust statistical methodologies, it will not be simple to integrate it into the Swedish environment.

Figure 3
Why sharing /reuse is hard now



II. Common Statistical Production Architecture

8. As part of the modernization effort, the High Level Group for the Modernization of Statistical Production and Services (HLG) wishes to take action in order to address the problems and issues described in the previous section. For this reason, HLG has put priority on the development of the Common Statistical Production Architecture (CSPA) and its implementation.

9. If the official statistical industry had greater alignment at the business, information and application levels, then sharing would be easier. CSPA will assist statistical organizations address these problems by providing a framework, including principles, processes and guidelines, to help reduce the cost of developing and maintaining processes and systems and improving the responsiveness of the development cycle. Sharing and reuse of process components will become easier - not only within organizations, but across the industry as a whole.

10. The value proposition of CSPA, in providing statistical organizations with a standard framework, is to:

- facilitate the process of modernization
- provide guidance for transformation within statistical organizations
- facilitate the reuse / sharing of solutions and services and the standardization of processes, and thus a reduction in costs of production
- encourage interoperability of systems and processes
- provide a basis for flexible information systems to accomplish their mission and to respond to new challenges and opportunities
- enable international collaboration initiatives for building common infrastructures and services
- foster alignment with existing industry standards such as the Generic Statistical Business Process Model (GSBPM) and the Generic Statistical Information Model (GSIM)

11. CSPA is the industry architecture for the official statistics industry. An industry architecture is a set of agreed common principles and standards designed to promote greater interoperability within and between the different stakeholders that make up an "industry", where an industry is defined as a set of organizations with similar inputs, processes, outputs and goals (in this case official statistics).

12. CSPA provides a reference architecture for official statistics. It describes:

- What the official statistical industry wants to achieve : this is the goals and vision (or future state)
- How the industry can achieve this: this is the principles that guide decisions on strategic development and how statistics are produced
- What the industry will have to do: the industry will need to adopt an architecture which will require them to comply with CSPA.

13. A number of frameworks focusing on specific areas have already been developed. CSPA builds on and uses these existing frameworks, notably the GSBPM and GSIM, as the necessary shared industry vocabulary. Adoption of these frameworks by organizations in the industry will improve the common understanding and alignment necessary for joint development, sharing and reuse of components.

14. CSPA complements and uses these pre-existing frameworks by describing the mechanisms to design, build and share components with well-defined functionality that can be integrated in multiple processes easily. CSPA focuses on relating the strategic directions of the HLG to shared principles, practices and guidelines for defining, developing and deploying Statistical Services in order to produce statistics more efficiently.

15. CSPA brings together these existing frameworks and introduces the new frameworks related to Statistical Services (described in Section V. Application Architecture) to create an agreed top level description of the 'system' of producing statistics which is in alignment with the modernization initiative.

16. CSPA gives users an understanding of the different statistical production elements (i.e. processes, information, applications, services) that make up a statistical organization and how those elements relate to each other. It also provides a common vocabulary with which to discuss implementations, with the aim to stress commonality. It is an approach to enabling the vision and strategy of the statistical industry, by providing a clear, cohesive, and achievable picture of what is required to get there.

A. Scope of architecture

17. CSPA is a reference architecture for the statistical industry. The scope of CSPA is statistical production across the processes defined by the GSBPM (i.e. it does not characterize a full enterprise architecture for a statistical organization). It is understood that statistical organizations may also have a more general Enterprise Architecture (for example an Enterprise Architecture used by all government agencies in a particular country).

18. CSPA is descriptive, rather than prescriptive, its focus is to support the facilitation, sharing and reuse of Statistical Services both across and within statistical organizations. CSPA is not a static reference architecture; it is designed to evolve further over time

19. CSPA is designed for use by investment decision makers in developed statistical organizations. While developing organizations are not excluded, a reasonable level of Enterprise Architecture maturity and a modern technical environment is required for implementation. There are options for making Statistical Services developed using CSPA

available to developing statistical organizations, these will be outlined in future versions of the architecture.

20. An important concept in architecture is the "separation of concerns". For that reason, the architecture is separated into a number of "perspectives". These "perspectives" are:

- Business Architecture which defines what the industry does and how it is done (statistics in our case)
- Information Architecture which describes the information, its flows and uses across the industry, and how that information is managed
- Application Architecture which describes the set of practices used to select, define or design software components and their relationships, and
- Technology Architecture which describes the infrastructure technology underlying (supporting) the other architecture perspectives.

21. CSPA includes

- Motivations for constructing and using CSPA through the description of requirements
- Sufficient business and information architecture descriptions and principles as are necessary for CSPA's scope
- Application architecture and associated principles for the delivery of Statistical Services
- Technology architecture and principles - limited to the delivery of Statistical Services

22. It should be noted that CSPA does not include enterprise, business, application and technology architecture descriptions which are not directly aligned to CSPA scope, nor does it prescribe technology environments of statistical organizations.

B. Service Oriented Architecture

23. The value of the architecture is that it enables collaboration in developing and using Statistical Services which will allow statistical organizations to create flexible business processes and systems for statistical production more easily.

24. The architecture is based on an architectural style called Service Oriented Architecture (SOA). This style focuses on Services (Statistical Services in this case). A service is a representation of a real world business activity with a specified outcome. It is self-contained and can be reused by a number of business processes (either within or across statistical organizations).

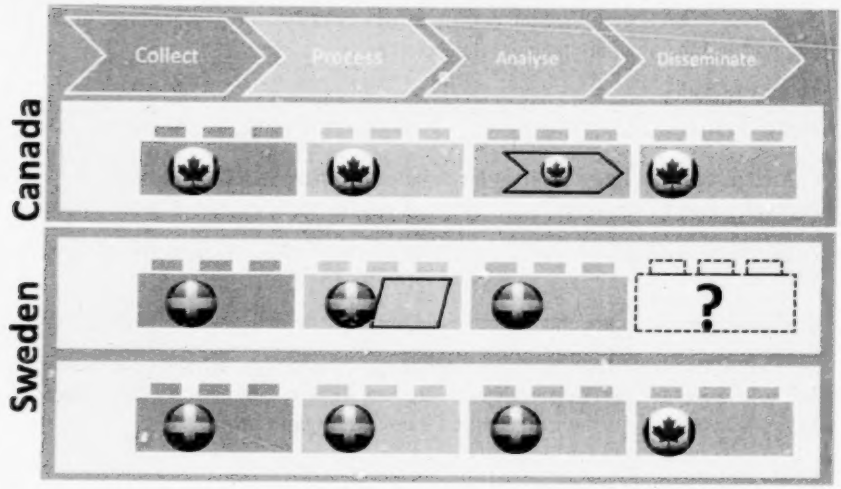
25. A Statistical Service will perform one or more tasks in the statistical process. Statistical Services will be at different levels of granularity. An atomic or fine grained Statistical Service encapsulates a small piece of functionality. An atomic service may, for example, support the application of a particular methodological option or a methodological step within a GSBPM sub process. Coarse grained or aggregate Statistical Services will encapsulate a larger piece of functionality, for example, a whole GSBPM sub process. These may be composed of a number of atomic services.

26. The granularity of Statistical Services should be based on a balanced consideration between the efficiency of the Statistical Service and the flexibility required for sharing purposes - larger Statistical Services will usually enable greater efficiency, whereas a finer granularity will allow greater flexibility for supporting sharing and reuse. Services, regardless of their granularity, must meet the architectural requirements and be aligned with CSPA principles.

27. By adopting this common reference architecture, it will be easier for each organization to standardize and combine the components of statistical production, regardless of where the Statistical Services are built. As shown in Figure 4, Sweden could reuse a Statistical Service from Canada because they both use the same component.

28. CSPA will facilitate the sharing and reuse of Statistical Services both across and within statistical organizations. The Statistical Services that are shared or reused across statistical organizations might be new Statistical Services that are built to comply with CSPA or legacy/existing tools wrapped to be Statistical Services which comply with the architecture. This is shown in Figure 4 by the shapes inside the building blocks.

Figure 4
Making sharing and reuse easier



C. Using CSPA

29. CSPA also provides a starting point for concerted developments of statistical infrastructure and shared investment across statistical organizations. CSPA is sometimes referred to as a "plug and play" architecture. The idea is that replacing Statistical Services should be as easy as pulling out a component and plugging another one in. There are a number of ways in which CSPA may be used by statistical organizations. These are outlined in the sections below.

1. Strategic Planning

30. If statistical organizations are creating and using an industry strategy ("Industry Architecture"), this leads to projects/work programs. An example is the Proof of Concept for CSPA. They could also integrate/streamline their investment strategies. Where a statistical organization plans to contribute to and or use CSPA in the future, they should modify and integrate their road maps to align with the CSPA framework. Each statistical organization needs to define a strategy to move from its current state to the common future state defined in their roadmap.

2. Development within statistical organizations

31. When a statistical organization identifies the need for a new Statistical Service, there are a number of options they can pursue. In order to fill the gap, the statistical

organization can look for Statistical Services that are available in the collaborative space (that is, in the Global Artefact Catalogue).

32. If an appropriate Statistical Service is not found in the CSPA Global Artefact Catalogue, the statistical organization can either:

- start designing and developing a new Statistical Service internally, or
- modify an existing Statistical Service to meet new functional and/or non-functional requirements.

33. This could be done independently or in collaboration with other statistical organizations. This development work should be done in alignment with CSPA to ensure that the new Statistical Services can be added to the CSPA Global Artefact Catalogue for sharing and reuse by other statistical organizations.

34. Sharing means exchanging concepts, designs or software, where each user of a service creates and operates its own implementation of that service. There are levels of sharing. A limited form of sharing would be to provide another participant with the means to replicate (make a copy) the asset (for example give the source code) (i.e. they share an aspect of the asset only). A more involved form of sharing would entail that asset is actually been made entirely common (in this case the asset is also reused).

35. Reuse means common use of a single implementation of a service, with only one organization acting as the service provider (the one who runs the service).

36. It is thought that in the current environment, it is more likely that statistical services will be shared across organizations rather than reused. Sharing between statistical organizations still leaves the option of reusing the various implementations internally within the environment of the individual statistical organization.

3. Vendors

37. A statistical organization may choose to have a vendor develop a Statistical Service. A vendor in this case means either a third party commercial vendor or a statistical organization that is selling a product. In the case of a new Statistical Service, the statistical organization should request that it is built in accordance with CSPA. When the product already exists, statistical organizations should verify together if the product meets relevant community requirements. If it does not, statistical organizations can try to influence the vendor to meet requirements. If it meets the community requirements, statistical organizations would ask the vendor to register the Statistical Service implementation to the Global Artefact Catalogue.

D. Impact on organizations

38. There will be a number of required changes for an organization implementing CSPA. Adoption of CSPA will require investment with a view to generating the long term benefits identified in the value proposition (see paragraph 10).

39. The main changes required at the organization level can be grouped as:

(a) People changes

- Openness to international cooperation
- Building trust in international partners (especially as they may be building services for your organization

- Sense of compromise (acceptance that nothing will be optimized for local use, rather it will be optimized for international or corporate use)
- Development of new functional roles to support use of the architecture (e.g. Assembler, Builder

(b) Process changes

- Adoption of an industry wide perspective
- Different approach to business process management and design
- Commitment to service (contract between different functional units)

(c) Technology changes

- setting up an adequate middleware infrastructure (messaging, repositories)
- uplift of physical network capabilities (bandwidth, etc.)
- management of security features

40. In addition to the costs and the targeted benefits, an organization adopting CSPA will benefit from:

- a sustainable and efficient strategy to cope with legacy and phasing out of existing applications
- a cycle that enables cost saving from reduction in production costs to be reinvested in further infrastructure transformation
- a positive image both on national and international/industry scene

III. Business architecture

41. The Statistical Network[2] is currently undertaking a project on Business Architecture. CSPA has adopted the outputs of this work.

42. The definition of Business Architecture being used by the Statistical Network Business Architecture is given below.

Business Architecture covers all the activities undertaken by a statistical organization, including those undertaken to conceptualize, design, build and maintain information and application assets used in the production of statistical outputs. Business Architecture drives the Information, Application and Technology architectures for a statistical organization.

43. CSPA focuses on architectural considerations associated with statistical production as bounded by GSBPM. Business concerns such as:

- ensuring that the corporate work program for a statistical organization best addresses the needs of its external stakeholders, or
- recruiting, retaining and developing staff with relevant skills are not central to CSPA. Such concerns are, however, very important considerations in an organization specific business architecture.

[2] The Statistical Network is a collaboration group involving the National Statistics Organisations of Australia, Canada, Italy, New Zealand, Norway, Sweden and the United Kingdom.

44. Organizations that have formally defined business architecture can reference CSPA when describing aspects of their business architecture which are fundamentally in common with other producers of official statistics.

A. Describing statistical production

45. To enable efficient and consistent documentation and understanding of CSPA three related concepts have been adopted which are relevant for all readers in relation to "Statistical Production". These are Business Function, Business Process and Business Service.

46. The terms and definitions used in CSPA for these concepts are drawn from GSIM. The terminology and modelling of GSIM aligns with The Open Group Architectural Framework (TOGAF). TOGAF is widely known for defining architectural frameworks.

47. Following is a brief overview of these three concepts[3], a more detailed discussion of these concepts and statistical production is contained in Annex 1.

1. Business Function

48. GSIM defines "Business Function" as *something an enterprise does, or needs to do, in order to achieve its objectives.* This represents a simpler expression of the definition used in TOGAF.

49. When identifying Business Functions, the emphasis is on an enterprise level ("whole of business") perspective, recognizing that different parts of the business may have different detailed requirements in regard to a particular function. At the level of the Business Function, there is no implementation detail.

2. Business Process

50. A Business Process is a set of process steps to perform on or more Business Functions to deliver a Statistical Program. Key aspects include:

- a process consists of a series of steps (activities/tasks)
- there is sequencing (or "flow") between steps
- a business process is undertaken for a particular purpose
- what is represented (for the sake of simplicity and clarity) as a single step in a high level depiction of a process might – when viewed in more detail - comprise a lower level (sub)process consisting of multiple steps

3. Business Service

51. A Business Service is the means of accessing a Business Function. It will perform one or more Business Processes. It is the who - or what - will undertake the work associated with each function. Business services should be scoped to support flexible sequencing and configuration of Business Functions within different Business Processes. A Business Service has an explicitly defined interface that requires the knowledge of what the service will deliver (including in what time frame) given a particular set of inputs. A Statistical Service is a kind of Business Service.

[3] Descriptions are also available via the CSPA Glossary

52. A central aim for CSPA is to enable more efficient and flexible support for statistical production as described by the GSBPM. Future versions of CSPA will provide more guidance on how CSPA can be applied when designing, managing and performing statistical business processes. However, the initial focus in the development of CSPA has been to clearly and consistently define (both conceptually and in practice) the Statistical Services which support statistical production. The aim is that equivalent business functions (such as imputation) within many different statistical business processes[4] will be able to reuse (or share) the same Statistical Service in the implementation of the business service.

53. Key reasons for the initial focus on Statistical Services include:

- Common Statistical Services provide the greatest opportunity for realizing savings through collaborative development, sharing and reuse
- While common statistical standards (or reference frameworks) have been agreed for business processes (GSBPM) and for statistical information (GSIM), there is not yet a common framework for Statistical Services, CSPA is filling this gap
- Once a common approach to the definition and implementation of Statistical Services is agreed, this will support defining business processes which make use of the common Statistical Services in a manner that supports the delivery of a specific business service, within a given context and purpose (business process) aligned to the business function (GSBPM).

B. Business Architecture Principles

54. Principles are high level decisions or guidelines that influence the way processes and systems are to be designed, built and governed. Principles are derived from the mission and values of the organization, taking into account the opportunities and threats that the organization faces. In CSPA, principles are used to express the high level design decisions that will shape the future statistical processes and systems.

1. Decision principles

55. Decision principles are guidelines to help decide on strategic development. They provide a basis for decision making and informing how the mission is fulfilled. They help enable sound investment decisions. The following decision principles support the outcomes sought by the High Level Group and key elements of the United Nations Principles for Official Statistics. These principles provide a basis for decision making and inform how a statistical organization sets about fulfilling its mission through strategic development.

56. A number of principles which are common to most organization's business architecture (whether formally defined or not) are being identified through other initiatives such as work within the Statistical Network. The following business architecture decision principles are being jointly developed via the Statistical Network business architecture project[5] and the CSPA project:

(a) Principle: Capitalize on and influence national and international developments

[4] Whether these business processes relate to different subject matter domains in one statistical agency and/or equivalent subject matter domains in different agencies.

[5] The Statistical Network Business Architecture Project intends to expand these principles to include rationales and implications. These will be incorporated when developed.

Statement: Collaborate nationally and internationally to leverage and influence statistical and technological developments which support the development of shared statistical services.

(b) Principle: Deliver enterprise-wide benefits

Statement: Design and implement new or improved statistical business processes in a way that maximizes their value at an enterprise level.

(c) Principle: Increase the value of our statistical assets

Statement: Add value to the statistical organization's statistical assets (either directly or indirectly) through improved accessibility and clarity, relevance, coherence and comparability, timeliness and punctuality, accuracy and reliability and interpretability.

(d) Principle: Maintain community trust and information security

Statement: Conduct all levels of business in a manner which build the community's trust. This includes the community's trust and confidence in the statistical organization's decision making and practices and their ability to preserve the integrity, quality, security and confidentiality of the information provided.

(e) Principle: Maximize the use of existing data/Minimize respondent load

Statement: Leverage existing data from all sources (e.g. statistical surveys or administrative records) before collecting it again. Statistical organizations are to choose the source considering quality, timeliness, cost and burden on respondents. Statistical authorities monitor the respondent burden and aim to reduce it over time

(f) Principle: Sustain and grow the business

Statement: Focus investment and planning on long term sustainability and growth, both in terms of the organization's role and position within its own community as well as internationally.

(g) Principle: Take a holistic and integrated view

Statement: Ensure data, skills, knowledge, methods, processes, standards, frameworks, systems and other resources are consistent, reusable and interoperable across multiple business lines within a statistical organisation.

2. Design principles

57. CSPA aims to support organizations in realizing these decision principles in practice. The Business Architecture design principles have been identified for CSPA in conjunction with the Statistical Network Business Architecture project.

(a) Principle: Consider all capability elements

Statement: Consider all capability elements (e.g. methods, standards, processes, skills, and IT) to ensure the end result is well-integrated, measurable, and operationally effective.

(b) Principle: Re-use existing before designing new

Statement: Re-use and leverage existing data, metadata, products and capability elements wherever possible before designing new.

(c) Principle: Design new for re-use and easy assembly

Statement: Design and standardize all new data, metadata, products and capability elements for re-use, so they can be easily assembled and modified to accommodate changing user demands.

(d) Principle: Processes are metadata driven

Statement: Ensure the design, composition, operation and management of business processes, including all input and output interactions, are metadata driven and automated wherever possible.

(e) Principle: Adopt available standards

Statement: Aim to adopt open, industry recognized, and international standards where available. Statistical industry standards such as the Generic Statistics Business Process Model (GSBPM) and the Generic Statistical Information Model (GSIM) are examples of the standards to be used.

(f) Principle: Designs are output driven

Statement: Ensure the whole statistical process is output-driven. Output is the reference starting point; the statistical production process starts from the output desired, that is from required products, and goes backwards, defining the various aspects of the process.

(g) Principle: Enable discoverability and accessibility

Statement: Ensure data, metadata, products and capability elements are discoverable and accessible to achieve the benefits from sharing and reuse.

58. The Information and Application architecture design aspects of CSPA are directed by the CSPA Business Architecture design principles.

IV. Information Architecture

59. The Statistical Network Business Architecture provides the following definition of Information Architecture:[6]

Information Architecture (IA) classifies the information and knowledge assets gathered, produced and used within the Business Architecture. It also describes the information standards and frameworks that underpin the statistical information. IA facilitates discoverability and accessibility, leading to greater reuse and sharing.

60. In other words, Information Architecture connects information assets to the business processes that need them and the IT systems that use and manage them.

61. It includes relating the coherent and consistent definition of information assets at an enterprise level to the information needs of specific business processes and IT systems in practice.

62. As an industry architecture, the Information Architecture set out by CSPA must provide an agreed and actionable (rather than purely conceptual) connection between

- the common information frameworks and implementation standards agreed within the industry (e.g. GSIM, SDMX, DDI), and
- the practical business goals and needs to be supported under CSPA, such as the ability to share and reuse Statistical Services

63. It must support the needs of:

[6] While the standards body responsible for TOGAF recognises the term "Information Architecture", the formal model underlying TOGAF refers to "Data Architecture". .

- business leaders, planners and process designers who are seeking to apply the Business Architecture from CSPA and who need to understand the connection between processes and information at a business level
- application architects and developers who are seeking to apply the Application Architecture from CSPA and who need to understand how Statistical Services interact with information

A. Reference frameworks and their use

64. The Information Architecture will identify common reference frameworks to be used for aligning communication and high level (conceptual) designs.

- GSBPM will be used as a common reference when recording information in regard to business processes.
- GSIM will be used as a common reference when defining the information input to, and output from, business processes.
- A common reference framework for recording information in regard to the definition of Statistical Services is being developed as part of CSPA (this is described in Section V. Application Architecture).
- A common reference framework to use when describing statistical methods is a gap at this stage.

65. The completed Information Architecture will not only identify the reference frameworks which apply but also provide guidance on how they are applied, in combination, within CSPA.

B. CSPA implementation specifications

66. A major barrier to effective collaboration within and between statistical organizations has been the lack of common terminology. Using GSIM as a common language will increase the ability to compare information within and between statistical organizations. It allows all processes that lead to the production of statistics to be described in one integrated information model.

67. Although GSIM can be used independently, it has been designed to work in conjunction with the GSBPM. It supports GSBPM and covers the whole statistical process. It is assumed in this document that an organization either uses the GSBPM or uses another business process model, which can be mapped to the GSBPM.

68. In order for interoperability and reuse to be supported in practice when applying CSPA, the industry needs to do more than align conceptual designs using common frameworks. While GSIM is a conceptual framework for describing Statistical Information, when it comes to describing information objects in the real world we need to describe them in terms of standards for representing those objects physically (i.e. in practice) in a manner which is consistent with GSIM.

69. It is necessary to specify how a conceptual design is to be translated into an implementation which is consistent and readily sharable in practice.

70. This "standard" means of operationalizing conceptual designs can be referred to as an implementation specification (in this case, GSIM Implementation). To this end, the following has been agreed:

- No firm recommendation has yet been made on implementation specification for business processes.
- Depending on what information is being represented in practice, DDI and SDMX are expected to provide the primary basis for CSPA implementation specification in regard to statistical information (e.g. data and metadata).
- An implementation specification for Statistical Services is being developed as part of CSPA.

71. There is a need to do more than simply refer to relevant existing standards such as SDMX and DDI. The CSPA implementation specification for Statistical Services will specify:

- whether SDMX, DDI or a custom schema should be used for representing a particular GSIM information object, and
- exactly how the chosen schema will be applied for the particular purpose. In many instances there are multiple technically compliant means of achieving the same business purpose, the implementation specification will specify which should be used.

72. Implementation specifications mean CSPA is prescriptive in regard to some practical details. While it would be simpler to align with CSPA if it was less prescriptive, the practical value from alignment would be much less. It is often the case that two developments which have a "common conceptual basis", but were implemented using completely unrelated approaches, are difficult and expensive to make interoperable and/or sharable (if it is possible at all).

73. In addition, an organization which has already implemented a different standard, or a local specification, can "map" their existing approach to the relevant implementation specification – they are not required to "rebuild" from first principles.

74. CSPA implementation specifications specify approaches which will support maximum interoperability/sharability on a cost effective basis. In particular cases it may be difficult for an organization to fully comply with a CSPA implementation specification (due to operational constraints). In these cases, compliance to the extent practical will, generally, still realize significant benefits. In other words, while CSPA implementation specifications set the bar reasonably (but not unreasonably!) high, it is recognized not all implementations may be able to achieve it fully in practice.

C. Information architecture principles

75. A number of principles which are common to most organization's information architecture (whether formally defined or not) have been agreed. These are outlined below.

(a) Principle: Manage information as an asset

Statement: Information is an asset that has value to the organization and must be managed accordingly.

(b) Principle: Manage the information lifecycle

Statement: All information has a lifecycle and should be managed to provide reliable identification, versioning and all information should be managed independently and beyond the scope of a single service.

(c) Principle: Protect information appropriately

Statement: All personal, confidential and classified data should be protected and the data should be treated accordingly.

(d) Principle: Use agreed models and standards

Statement: All information used as inputs and outputs to Statistical Services should be described using a common, business-oriented, reference model. A single standard should be used to define the encoding of each type of information.

(e) Principle: Capture information as early as possible

Statement: Information should be captured in a standard structured manner at the earliest possible point in the statistical business process to ensure it can be used by all subsequent services.

(f) Principle: Describe to ensure reuse

Statement: All information should be described in a manner that ensures information is reusable between services. Reuse is intended to reduce duplication, additional human intervention and reduce errors.

(g) Principle: Ensure there is an authoritative source

Statement: Information consumed and produced by services should be sourced and updated from a single authoritative source. Information should be consistent across all relevant services.

(h) Principle: Preserve information input into Statistical Services

Statement: Information that is input into services must be preserved in the service output to ensure no information loss.

(i) Principle: Described by metadata

Statement: All information consumed and produced by services must be described by sufficient metadata.

V. Application Architecture

76. The Statistical Network Business Architecture provides the following definition of Application Architecture:

Application Architecture (AA) classifies and hosts the individual applications describing their deployment, interactions, and relationships with the business processes of the organization (e.g. estimation, editing and seasonal adjustment tools, etc.). AA facilitates discoverability and accessibility, leading to greater reuse and sharing.

77. The CSPA Application Architecture is based on an architectural style called Service Oriented Architecture (SOA). This style focuses on Services (or Statistical Services in this case). A service is a representation of a real world business activity with a specified outcome. It is self-contained and can be reused by a number of business processes (either within or across statistical organizations).

78. Statistical Services are defined and have invokable interfaces that are called to perform business processes. SOA emphasizes the importance of loose coupling. Interactions between Statistical Services are independent, that is, they do not talk directly to each other. Organizations will need a technology solution to support communication between Statistical Services. This solution (for example a communication platform) will not affect the interfaces. It should be noted that SOA is not the same as Web Services, although they are often used in SOA.

A. Statistical service definitions, specifications and implementation descriptions

79. The level of reusability promised by the adoption of a SOA is dependent on standard definitions of the services. CSPA has three layers to the description of any service. These layers are described in the following paragraphs and Figure 5.

1. Statistical Service Definition

80. The Statistical Service Definition is at a conceptual level. In this document, the capabilities of a Statistical Service are described in terms of the GSBPM sub process that it relates to, the business function that it performs and GSIM information objects which are the inputs and outputs.

2. Statistical Service Specification

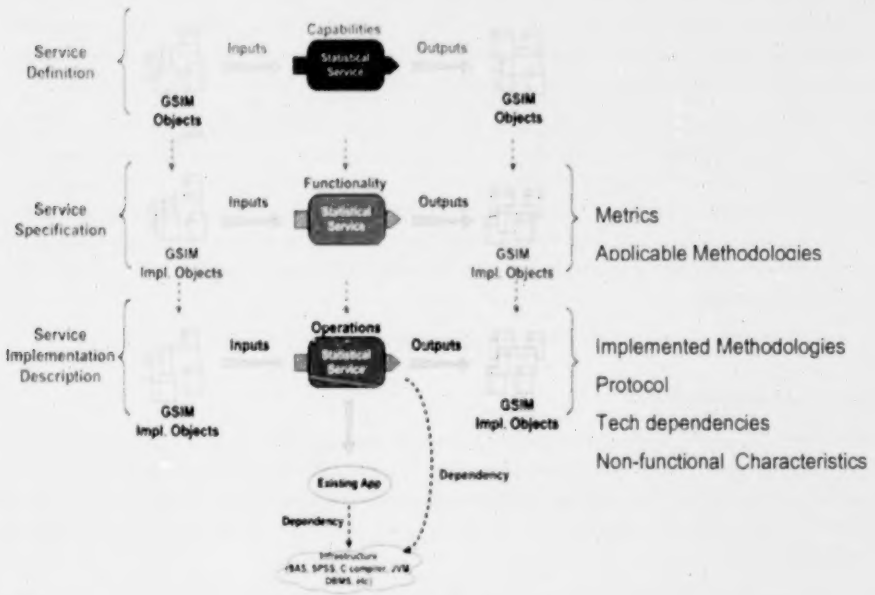
81. The Statistical Service Specification is at a logical level. In this layer, the capabilities of a Statistical Service are fleshed out into business *functions* that have GSIM implementation level objects as inputs and outputs. This document also includes metrics and methodologies.

3. Statistical Service Implementation Description

82. The Statistical Service Implementation Description is at an implementation (or physical) level. In this layer, the functions of the Statistical Service are refined into detailed operations whose inputs and outputs are GSIM implementation level objects.

83. This layer fully defines the service contract, including communications protocols, by means of the Service Implementation Description. It includes a precise description of all dependencies to the underlying infrastructure, non-functional characteristics and any relevant information about the configuration of the application being wrapped, when applicable.

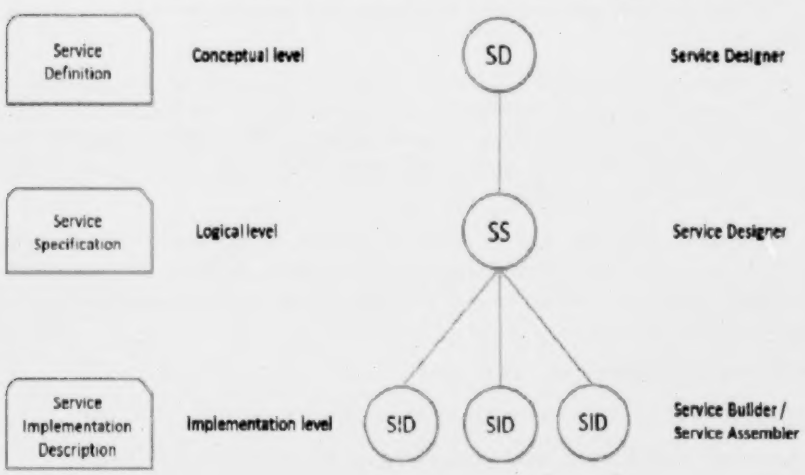
Figure 5
Service interfaces at different levels of abstraction



84. In general, there will be one Service Specification corresponding to a Service Definition, to ensure that standard data exchange can occur. At the implementation level, services may have different implementations (software dependencies, protocols, supported methodologies) reflecting the environment of the supplying organization. Each implementation must rigidly adhere to the data format specified in the Service Specification

85. There are a number of roles identified in CSPA (see Section VII) who are involved in the definition, specification, and implementation of Statistical Services. Figure 6 illustrates the relationship between these levels.

Figure 6
Linkages between Statistical Service Definition, Specification, and Implementation



B. Architecture patterns

86. In simple terms, architecture patterns describe a re-usable solution to certain classes of problems. They explain how, when and why Statistical Services can be used, as well as the impact of using them in that way. They help a Service Assembler to identify combinations that have been used successfully in the past. Although not identified in this document, there are also anti-patterns which are examples of what should not be done.

87. The benefits of using architecture patterns can be described by using the analogy of an expert chess player. To play chess, you must learn the rules and the principles (for example the value of different pieces). However, to improve and become a really good player, you need to learn the patterns used by more experienced players and apply them to your game. In the same way, you can use the principles and non-functional requirements of CSPA, but to get the maximum benefit, Service Assemblers will need to learn the architecture patterns.

88. CSPA will incorporate the Request/Response and Publish/Subscribe patterns.

1. Request/Response pattern

89. The Request/Response pattern for activating services implies a rather fixed routing of messages between services. The integration infrastructural platform implementing the process "orchestrates" the routing and executing of services. This pattern leads to less flexibility and tighter coupling between services than the Publish/Subscribe pattern described below.

90. An example of how this pattern could be applied in relation to collection is each questionnaire is stored in an entity service. The entity service exposes the operation to get the questionnaire through a service call. The indicators are computed and stored and made available using an entity service call.

91. The Request/Response pattern can be used if:

- A functional style and sequential flow is required
- It is known precisely which service interface should be called

2. Publish/Subscribe pattern

92. The Publish/Subscribe pattern could be considered an asynchronous version of the Request/Response pattern.

93. As an event is generated by an event source and is sent to the processing middleware. It is not known which functionality is triggered next. In the Request/Response pattern, the concrete service call would have been made, but this is not the case for the Publish/Subscribe pattern. For this reason, the Publish/Subscribe pattern talks about "decoupling" rather than loose coupling.

94. An example of how this pattern could be applied in relation to collection is when each questionnaire completed publishes an event that is available for subscribers downstream. Early indicators can be produced by processing collection events straight through aggregation

95. The Publish/Subscribe pattern can be used if:

- All recipients that may be interested in the event should be notified
- It is not exactly known which and how many recipients are interested in the event

- It is not known how recipients respond to this event
- Different recipients respond differently to the same event
- Only one-way communication from the sender to the recipient is possible

C. Non-functional requirements

96. In the context of CSPA, a non-functional requirement is a requirement that relates to the operation of a system. While functional requirements define what the services does (for example, error localization), the non-functional requirements describe a performance characteristic of a system (for example, authorization of who can access the resources and functions of the service). That is, non-functional requirements determine how a service behaves rather than what it should do.

97. Non-functional requirements are important to be captured in the design of the services. They have a significant influence on the software architecture of a service. The Designer[7] of a Statistical Service should identify the non-functional requirements that are relevant to that service when they are designing it. The implementation of a Statistical Service provides some functional value when assembled into a value chain within an organization. The non-functional requirements of a Statistical Service address other concerns or behaviours of the service such as performance, security, process metrics and error handling. This section provides some guidance on these concerns.

1. Multilingual Support

98. It is necessary to provide multilingual support to enhance the usability and the capacity to share Statistical Services. All services must be documented at least in English in addition to the local language(s) of the organization developing the Statistical Service. It is highly recommended that organizations that have made translations of the documentation of a Statistical Services in additional languages make them available to the community.

2. Security

99. For the purpose of this document, the security concern relates to controls that are put in place to mitigate the risk that a Statistical Service or the data it controls is misused. This section provides some basic guidance on some of these controls. However, in general it is strongly advised that each Statistical Service implementation complete a Risk Assessment and document a Risk Mitigation Plan for high and extreme risks identified in the assessment.

A. Authentication and Authorization

100. For users interacting with a Statistical Service, the process of identifying who they are (authentication) and working out what resources and functions of the service they can use (authorization) will need to be managed as part of the service. Given that the security architecture and services is a local organization concern, our goal is to avoid excess complexity in these interactions.

101. Authentication should be accomplished through interaction with the communication platform's authentication function

[7] NB: A description of all CSPA roles can be found in Section VII of this document

102. Authorization controls are the concern of the service implementation. Authorization will be controlled by either administrative interfaces on the service or via a GUI-based client for the specific service.

103. After the release of v1.0, future iterations of CSPA will look at options to 'design in' support for single sign on. Consideration will also be given in future CSPA versions to how the architecture can describe a common approach for the communication platform to pass authorization information along with other service context information.

B. Data at rest

104. Data at rest is of particular interest when a Statistical Service needs to defer state (see discussion in "Service Statelessness" in section V D). Under this circumstance, the security (e.g. encryption requirements or access control) of the data are entirely the responsibility of the Statistical Service. Where a Statistical Service already has a functional dependency on underlying technologies or platforms, it would be reasonable to make use of security functions available in those technologies.

C. Data in transit

105. Security of data in transit (e.g. contained within a message flow as part of a service invocation) will be considered in future iterations of CSPA (post version 1.0).

106. Sensitivity of statistical data varies amongst organizations and at this stage the architecture does not attempt to converge on a standard definition or treatment.

D. Machine to machine certification

107. Guidance for this will come in a future iteration of CSPA (post version 1.0). Organization specific implementations based on assembly time infrastructure can assure security for service communication (for example, use of a VLAN).

E. Performance

108. No specific guidance is provided on the performance characteristics. However, they should be declared in the Statistical Service Implementation Description and it is recommended that examples of performance level are included

F. Process Metrics

109. A Statistical Service will generally capture metrics related to the function that it performs. To all intents and purposes, these process metrics are treated by the Statistical Service as just one of its outputs and should be reflected as such in the Statistical Service Specification.

G. Error Handling

110. Error handling, in this case, relates to situations where the service fails. Error handling is left to the communication platform to handle as required. Generally there will be protocol specific requirements for flagging errors. The error codes and their meanings need to be documented in the Statistical Service Implementation Description.

D. Implementing Protocols in a Statistical Service

1. Service Statelessness

111. The principle of service statelessness is, in essence, that - An individual service should be called with all the information it needs to complete, the service shouldn't rely on previous execution. However there are cases where a Statistical Service needs to defer or persist some form of state. This principle trades off flexibility of the service to fit into a particular process with scalability of the service.

112. For CSPA, this means that there are certain situations when the Statistical Service needs to be able to keep information within the Service until a later time.

113. When designing and building a Statistical Service, the capability of deferring state information is important in two specific situations:

- When the Statistical Service needs to be used in a publish subscribe design pattern.
- When the Statistical Service involves human-interaction and can therefore be considered long-running.

114. Statistical Services with the capability of deferring state needs to provide an endpoint to support enquiries about the deferred state. If the Statistical Service is invoked but it lacks some or all of the required information to perform the service invocation, the Statistical Service should handle this using error handling.

2. Event Messaging and Request Response

115. Communication to and from a Statistical Service could be done using several communication patterns. The two main patterns of communication that CSPA supports are Request Response and Event Messaging. These patterns differ mainly in when the information is being transferred.

116. In the *Request Response* communication pattern, information is requested whenever a Statistical Service needs it. The information need could be triggered by either a human-interaction with a Statistical Service or when an automated Statistical Service is called from a communication platform.

117. In *Event Messaging*, information is transferred as it is created. This means a Statistical Service does not need to request information as information is provided to all relevant Statistical Services at the time of creation.

118. The decision as to whether a Statistical Service is built to support both of these communication patterns is related to the environments in which the Statistical Service will work in. Supporting both communication patterns is preferred as this allows the Statistical Service to function both in Statistical Organizations using request-response as the main pattern as well as Statistical Organizations using Event Messaging as the main pattern.

119. From the point of view of a Statistical Service, there is no difference between the Request-Response and Event Messaging communication patterns, as the provision of information is done in the same manner. When a communication platform supplies the information that the Statistical Service needs, it does so by calling the relevant endpoint provided by the Statistical Service.

120. To support a *Request Response* communication pattern, the Statistical Service must provide some endpoint where an information request can be made. One possibility is that the Statistical Service is required to have an endpoint that can be supplied with parameters. These parameters would describe what information should be part of the response. For example, the parameters could include being able to specify a timeframe or a context.

121. To support *Event Messaging*, the Statistical Service needs to be able to push information out from the Statistical Service when it is created. This could be done using a configurable endpoint or message queue provided by the communication platform. Configuring the endpoint should be done by the Service Assembler.

3. How to invoke a service

122. A protocol is the technical implementation of a communication mechanism. It is used to invoke the Statistical Services deployed in a CSPA implementation.

123. A Statistical Service Implementation Description must specify one or more protocols. These protocols are associated with the following aspects of a Statistical Service.

- making the Statistical Service reachable as an endpoint for invocation
- accessing data that is declared to be passed by reference in the Statistical Service Specification

124. In the following, we provide a list of protocols that are accepted within Service implementations conforming to the CSPA specification. Protocols tagged as "recommended" should be considered in the first place because they represent established industry standards and as such they are likely to be supported in most organizations. Protocols that are accepted yet not recommended are listed for supporting legacy requirements of some organizations.

A. Protocols for invoking service endpoints

125. The protocols for invoking service endpoints which are recommended by CSPA are:

- SOAP Web Services – Service exposes a WSDL interface and is addressed by a http URI
- REST Web Services - Service exposes a REST interface and is addressed by a http URI

126. There are also a number of other protocols which are acceptable. These are:

- Microsoft Message Queue - Service is a MSMQ consumer
- Java Messaging Service - Service is a JMS consumer
- File-based invocation – the service is "invoked" when a file is placed at a known location which results in an OS-level trigger to the service; alternatively, the service can poll the location for arrival of "message" files and treat them as service invocations
- Command line interface - Service is invoked by specifying a command line to be executed on operating system runtime accessible by the platform.

127. CSPA recognized that there are other future protocols. However, these will require further exploration:

- Possible use of "stream control transfer protocol" (sctp), an efficient guaranteed delivery, connectionless, lightweight transfer protocol

128. In some instances, existing tools support database access. If the database is involved in transfer (and not merely as a local state storage for the service), we recommend that the database access be mediated through the http: protocol access above.

129. In general, the use of an "out of band" data transfer mechanism should be avoided wherever possible, and used only in circumstances involving the need to transfer large

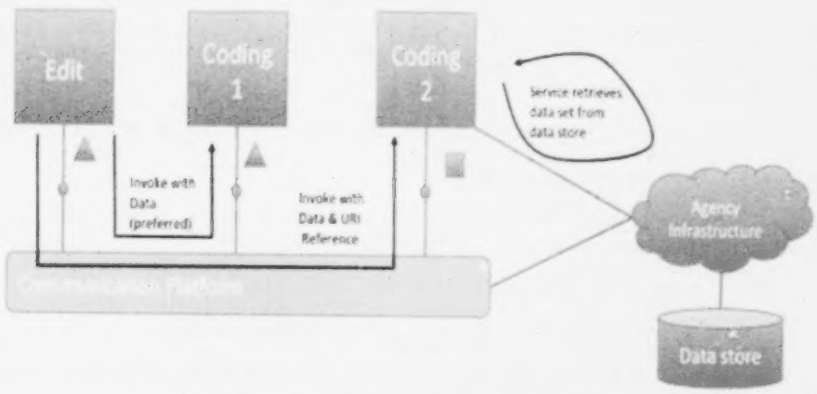
volumes of data. Its addition adds increased coupling between the architecture and services, so its use must be managed carefully.

B. Protocols for passing data by reference

130. A data reference must guarantee, in the context of a specific protocol, that it can uniquely identify a dataset, file, etc. Passing data by reference requires the communication platform to support the resolution of an identifier through the specific protocol it refers to.

Figure 7

Managing large data volume transfers using "pass by reference



131. As a general rule, service invocation will involve the Statistical Service receiving a message via the organization-provided communication platform. This message will contain the necessary information objects as well as the requested service.

132. In certain circumstances, the service requires large data sets as inputs. Examples of this could include administrative data files or large survey response files. The problem is similar to a "pass by value" situation in that the input data is passed to the service via in-message approaches.

C. Problem

133. There are a number of problems that can arise if we attempt to send these data sets via the messaging interface:

- Dataset transfer time can be slow due to messaging overhead (packing / unpacking of data, message segmentation and reassembly, etc.)
- Communications platform performance may degrade due to the load of transporting the messages between services
- Service memory requirements can increase before required use (see State Deferral discussion

D. Solution

134. In order to address this problem, we provide a "pass by reference" mechanism (see Figure 7) that avoids the need to use the communication platform messaging layer to transport these large data sets.

135. The approach is as follows

- The data set being sent to the service is stored in a source location in a manner local to each organization – the location name is associated with a Uniform Resource Identifier (URI)
- The service consumer invokes the requested service by sending it a message containing the URI for the dataset
- The service provider receives the URI reference and when ready attempts to retrieve the dataset from repository or cache. If successful, it executes its service actions
- Upon completion, it may update or place a resulting dataset (if relevant) in the repository or cache

136. The implementation of a data source is local to each organization and may be implemented as part of the communications platform. Organizations may choose to implement a utility service, a repository, a file cache, or some other mechanism. URI management is also a part of local operation.

137. CSPA provides the following guidance for service input dataset retrieval protocols.

(a) Recommended protocols:

- Simple http: file transfer from data source to the service logic (without additional protocols such as REST)

(b) Acceptable protocols:

- ftp: file transfer from the data source to the service logic
- Use of network file system services (such as SMB, NFS) with appropriate file reference

(c) Not Recommended:

- Database retrieval using queries

E. Application Design Principles

138. The design principles have been selected to maximize the flexibility of the Statistical Services wrapped or developed in the context of CSPA. The flexibility of the Statistical Service directly impacts the level of reuse, the flexibility required of the industry vision and the ease with which a statistical organization can implement a Statistical Service.

(a) Principle: Maintain independence between design and implementation

Statement: The descriptions of Statistical Services are layered in conceptual (Statistical Service Definition), logical (Statistical Service Specification) and implementation (Statistical Service Implementation Description).

(b) Principle: Use available standards

Statement: The design of Statistical Services should align with, and harness, relevant existing standards and frameworks wherever possible.

(c) Principle: Use architecture patterns

Statement: Follow architecture patterns depending on best fit to requirements.

(d) Principle: Implement using GSIM

Statement: Manage standardized service contracts based on GSIM objects

(e) Principle: Minimize coupling .

Statement: Enable services to be loosely coupled externally and be aware of internal coupling.

(f) Principle: Maximize Service Autonomy

Statement: Maximize service autonomy (completeness) to enable share-ability and reusability (External & Internal).

(g) Principle: Include non-functional requirements

Statement: Non-functional requirements form a key input in design decisions.

VI. Technology Architecture

139. The Statistical Network Business Architecture provides the following definition of Technology Architecture:

Technology Architecture (TA) describes the IT infrastructure required to support the deployment of business services, data services and applications services, including hardware, middleware, networks, platforms, etc.

140. Within each statistical organization, there needs to be an infrastructural environment in which the generic services can be combined and configured to run as element of organization specific processes. This environment is not part of CSPA. CSPA assumes that each statistical organization has such an environment and makes statements about the characteristics and capabilities that such a platform must have in order to be able to accept and run Statistical Services that comply with CSPA.

141. Platform for Service Communication: A communication platform provides the capability for communication between Statistical Services. It enables inter-service communication while allowing Statistical Services to remain autonomous and adds additional capabilities for monitoring and orchestrating the information flow. To assemble a built Statistical Service, the communication platform is updated to integrate with new services. There are multiple ways of establishing a communication platform. Examples of architectural components could be BPMS, ESB, Workflow Engines, Orchestration Engines, Message Queuing and Routing.

142. Platform for Configuring and Controlling Services and Processes: The Platform for Controlling Service and Process execution encompasses the functionalities and tools to support the management and maintenance of services metadata, artifacts and policies. Examples of how this mechanism could be achieved include Business Process Modelling System, Lifecycle Management, Service Monitoring and Management.

143. Platform for Reporting on Services and Processes: The Platform for reporting is responsible for enabling real-time monitoring and near-real-time presentation of user defined business key performance indicators (KPIs). Examples of how this mechanism could be achieved are Static Dashboard or Business Activity Monitoring (also generates alerts and notifications to user when these KPIs cross specified thresholds).

A. Communication Platform

144. CSPA provides guidance on the way that organizations should go about building new or wrapping existing Statistical Services. When the time comes for an organization to use a Statistical Service that conforms to CSPA there are some organization specific technology approaches that also need consideration.

145. CSPA does not specify how organizations will coordinate the use of Statistical Services to implement a wider business process. Organizations will need a technology solution to support communication between Statistical Services since the Statistical Services are not to talk directly to each other.

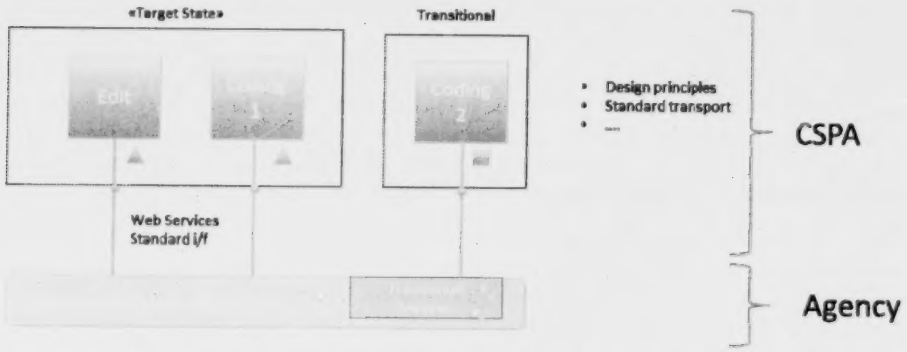
146. Where the Statistical Service being used is largely independent and interfaces between that Statistical Service and others it maybe manually managed by a person. There may also be other relatively trivial uses of Statistical Service where a bespoke solution to integrate them is developed. These are sub-optimal yet pragmatic ways of achieving reuse of Statistical Services

147. Where the integration of Statistical Services is non-trivial a communications platform of some sort will usually be required. The key functions of the communication platform are:

- Orchestration - managing the sequence of flow of invocations of the Statistical Services.
- Error handling - where Statistical Service fail or where the output of services contain erroneous cases that require a different treatment;
- Message payload translation - in particular where a Statistical Service does not support standard GSIM implementation objects - It is possible to offload this function to specialized Statistical Service;
- Auditing, Logging, Activity Monitoring;
- Performance Management;
- Security

148. Figure 8 illustrates the relationship between the elements that are specified in CSPA and the underlying Communications Platform that is local to an Organization.

Figure 8
Statistical Service Components and communications platform



149. In this diagram, two Statistical Services (Edit, Coding 1) have been defined and specified in compliance with CSPA, and their implementations are communicating with each other within the environment of a statistical organization. The Statistical Service instances communicate with each other through the organization's communication platform – this may be a full SOA implementation (bus or broker), a CORE implementation, or some other more rudimentary platform (or no platform at all).

150. It is important to state that CSPA does not prescribe the capabilities and architecture of the underlying Communications Platform – it instead assumes that an organization's Assemblers and Configurers will be responsible for addressing how the platform supports

the use of CSPA-compliant Statistical Services. This allows CSPA and its Statistical Services to be used by the widest possible community amongst statistical organizations, all of who may be in different stages of development and modernization.

151. In the diagram one can see that there is a second Coding Statistical Service (Coding 2) that doesn't (yet) implement the complete CSPA Statistical Service Specification due to a transitional state. An organization may optionally make use of some form of translation service to address differences between their interfaces (typically at the information encoding level). This is seen as a transitional state – the goal is to ensure that all services adhere to the Statistical Service Specification, while allowing for differences at the Statistical Service implementation level at the protocol level (and underlying platforms).

Annex

List of Abbreviations

BPMS:	Business Process Management System
CORE:	Common Reference Environment
CSPA:	Common Statistical Production Architecture
DDI:	Data Documentation Initiative
GSBPM:	Generic Statistical Business Process Model
GSIM:	Generic Statistical Information Model
HLG:	High Level Group for the Modernisation of Statistical Production and Services
JMS:	Java Messaging Service
MSMQ:	Microsoft Message Queue
OS:	Operating System
SDMX:	Standard Data and Metadata eXchange
SOA:	Service Orient Architecture
TOGAF:	The Open Group Architectural Framework
VLAN:	Virtual Local Area Network

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Item 6 (a) of the provisional agenda
Gender equality indicators

Indicators of gender equality

Note by the Task Force on Indicators of Gender Equality

Summary

This paper presents a set of 123 gender equality indicators recommended for use in member countries of the Conference of European Statisticians. The indicators are grouped in eight thematic domains inspired by the Beijing Platform for Action and categorized into 47 headline indicators and 76 supporting indicators. The proposals are based on the consideration of policy needs, existing indicator frameworks, relevance to the measurement of gender equality and international availability.

Section I of the report includes the framework for indicator selection, section II presents the summary of the proposed indicators, and section III provides an overview of issues requiring further work.

The full text on the Indicators of Gender Equality has been sent to all members of the Conference for electronic consultation. Subject to positive outcome of the consultation, the recommendations will be submitted to the 2014 plenary session of the Conference of European Statisticians for endorsement.

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I. Introduction

A. Background and objective

1. The need to monitor progress towards internationally agreed gender-related policy goals has led to the proliferation of indicators. The 2010 United Nations Economic Commission for Europe (UNECE) Work Session on Gender Statistics recognized that it is important to review the indicators developed for monitoring internationally agreed policy agendas with a strong gender dimension and to identify the key indicators that member countries of the Conference of European Statisticians (CES)[1] would be able to produce. Such a review would assess the indicators' suitability for describing major gender inequalities, for monitoring gender-relevant policies, their regular availability and comparability across countries.

2. In November 2010, the UNECE Task Force on Indicators of Gender Equality was set up to tackle these issues. The aim was to improve the monitoring of gender equality by consolidating and systematizing the existing proliferation of gender relevant statistical indicators, including developing a framework for grouping indicators by domain and a hierarchy of indicators (headline and supporting indicators in each domain), and by proposing measurement approaches where internationally consistent measures are lacking.

3. This paper contains the main results of this work. At its October 2013 meeting, the CES Bureau decided to send the full report, including an annex with detailed considerations for the selection of indicators, to all CES member countries for electronic consultation. If the outcome of the consultation will be positive, the report will be submitted to the CES 2014 plenary session for endorsement.

4. The report was prepared by the Task Force on Indicators of Gender Equality, which consisted of the following members: Cristina Freguja (Istat, Italy, Chair of the Task Force), Dean Adams and Rajni Madan (Australian Bureau of Statistics), Yafit Alfandari (Central Bureau of Statistics, Israel), Sara Demofonti, Lidia Gargiulo, Paola Ungaro and Maria Giuseppina Muratore (Istat, Italy), Marion van den Brakel (Statistics Netherlands), Maria José Carrilho (Statistics Portugal), Teresa Escudero (National Statistics Institute, Spain), Karen Hurrell (Equality and Human Rights Commission, United Kingdom), Ilze Burkevica, Ligia Nobrega and Anna Rita Manca (European Institute for Gender Equality), Piotr Ronkowski and Sabine Gagel (Eurostat), Adriana Mata Greenwood (International Labour Organization), Andres Vikat, Christopher Jones and Mihaela Darii-Sposato (UNECE).

5. The report has been discussed and agreed by the entire Task Force. Some organizations took the primary responsibility of drafting certain chapters, as follows:

- Statistics Netherlands – Poverty
- National Statistics Institute, Spain – Education
- Australian Bureau of Statistics – Health

[1] The Conference of European Statisticians is composed of national statistical organizations in the UNECE region (for UNECE member countries, see http://www.unece.org/oes/nutshell/member_states_representatives.html) and includes in addition Australia, Brazil, Chile, China, Colombia, Japan, Mexico, Mongolia, New Zealand and Republic of Korea. The major international organizations active in statistics in the UNECE region also participate in the work, such as the statistical office of the European Commission (Eurostat), the Organization for Economic Cooperation and Development (OECD), the Interstate Statistical Committee of the Commonwealth of the Independent States (CIS-STAT), the International Monetary Fund (IMF) and the World Bank.

- Istat, Italy – Violence
- Central Bureau of Statistics, Israel and UNECE – Economy
- UNECE – Power and decision-making, Media, Childhood and adolescents
- Statistics Portugal – Human rights
- European Institute for Gender Equality – Environment
- Eurostat – Demographic background

6. In this paper, section I includes the framework for indicator selection, section II presents the summary of the proposed indicators, and section III provides an overview of issues requiring further work. The full report includes detailed considerations for the selection of indicators are presented by topic. The rationale for the choice of indicators for each topic is explained with reference to the gender issues related to the topic, data availability, existing indicator frameworks and the criteria for indicator selection.

7. The proposed indicators aim at consistency with other indicator frameworks, such as the Global Minimum Set of gender indicators developed by the Inter-agency and Expert Group on Gender Statistics, the indicators for monitoring Millennium Development Goals, EU indicators for the Beijing Platform for Action and OECD indicator frameworks. Participation of the European Institute for Gender Equality (EIGE, located in Vilnius, Lithuania) in the Task Force ensured exchange of information with EIGE's work on the EU Gender Equality Index that evolved in parallel.

B. Framework

8. In recent years, the demand for statistical information by the media, policymakers and the scientific world has grown considerably together with the rapid and substantial changes that have characterized the lifestyles of men and women in the society. For this reason, the national statistical offices are facing a growing demand for more timely and detailed statistics.

9. Statistics and indicators that reflect the realities of the lives of women and men are needed to describe their role in the society, economy and family, formulate and monitor policies and plans, monitor changes, and inform the public. Gender indicators have the function of pointing out gender-related changes in society over time, and therefore to measure whether or to what extent gender equality is being achieved. The compilation of gender equality indicators relies on international monitoring initiatives and takes into account the existing demand for statistical information in this field at national and international levels.

10. The Inter-agency and Expert Group on Gender Statistics under the United Nations Statistical Commission has established a minimum set of gender indicators for international compilation worldwide, to provide a basis for monitoring gender issues on the global level[2]. This Global Minimum Set contains the minimum common denominator for statistics on gender equality and women's empowerment. It is expected to be the basis for regional and national exercises of indicator development. The indicator set presented here incorporates the great majority of the indicators of the global minimum while including many in addition. The few Global Minimum Set indicators that are not included either are not relevant for most CES member countries or can be substituted with a more precise indicator available for most if these countries.

[2] Gender statistics: Report of the Secretary General. Annex II: Minimum set of gender indicators, United Nations, 2012

C. Selection criteria

11. The criteria for indicator selection were the following:

- The indicator clearly addresses a relevant policy issue related to gender equality and/or women's empowerment;
- The indicator is relevant to the CES member countries;
- The indicator is conceptually clear, easy to interpret, and has an agreed international definition;
- The indicator is sensitive to changes and changes in the value of the indicator have a clear and unambiguous meaning;
- The indicator is feasible, robust and reliable;
- The indicator is comparable over time and enables international comparison.

12. An essential feature of this set of indicators is the hierarchy of headline and supporting indicators. The headline indicators cover the most essential aspects. Their purpose is to provide simple and clear information to decision-makers and the public about progress towards internationally agreed gender-related policy objectives. The supporting indicators provide further information on more specific aspects of gender equality. They are valuable to achieve a deeper comprehension of the phenomenon.

13. Gender indicators, whether headline or supporting, are not merely statistics on men and women. They highlight the contributions of men and women to the society, their different needs and problems. A set of indicators that covers all relevant aspects is necessary, because in isolation, the interpretation of some indicators may be misleading. For example, the traditional focus on labour statistics has mainly been on employment and unemployment, but there is now a growing awareness that looking only at gender disparities in the work environment is insufficient. Gender inequality at the labour market can be underestimated if only employment and unemployment rates are included in the analysis. In fact, the employment rate can increase and unemployment rate can decrease at the cost of the growth of female inactivity, because these rates do not take into account the discouragement of women who give up looking for a job.

D. Domains

14. The Beijing Platform for Action (BPA)[3] is taken as a starting point for identifying the domains of gender equality, because it provides an internationally agreed framework for establishing a relationship between the indicators and the policy concerns. Indicators are proposed in the following domains:

- Poverty (area A of BPA);
- Education and training (B);
- Health (C);
- Violence against women (D);
- Economy, including the labour market and work-and-family issues (F);
- Women in power and decision-making (G);
- Media (J);

[3] Beijing Platform for Action, United Nations, 1995

- Environment (K);
- The girl child (L).

15. Domain E of BPA, "Women and armed conflict" is less relevant for the CES member countries and will not be considered in this framework. In domain H, "Institutional mechanism for the advancement of women", no indicators would require statistical methods for monitoring. This domain was therefore considered to be beyond the scope of the present set of statistical indicators.

16. The BPA promotes the human rights of women and girls through the full implementation of all human rights under Domain I, "Human rights of women", including civil, cultural, economic, political and social rights, including the right to development). This topic was considered, with the conclusion that the human rights aspects are covered under other domains and no additional indicators need to be proposed under this domain.

17. As general background information relevant to the present indicator set, a few indicators describing the demographic situation have been selected.

18. Although not explicitly addressed in BPA, the topic of power and decision-making in the household was deemed highly relevant for CES member countries. Different policy documents of the United Nations have called for designing programmes to address unequal decision-making powers within families and to support men's and women's joint control of household assets and joint household decision-making to guarantee adequate livelihoods for their families[4,5]. This topic is therefore included.

II. Proposed indicators

19. An overview of the selected headline and supporting indicators is displayed below in tabular format. Headline indicators are numbered using the convention that the first number represents the domain to which the indicator relates, and the second number is the number of the headline indicator, so that indicator 1.3 is the third headline indicator in the first domain (Poverty).

20. Supporting indicators are additionally identified with a third number, such that 1.3.1 is the supporting indicator for the headline indicator 1.3.[6] Given the remit of the Task Force to harmonise its recommended indicators with existing gender indicator frameworks and policy commitments, columns are displayed detailing the relevant indicators from the Global Minimum Set, as well as BPA Strategic Objectives.

21. Since the purpose of the indicators is to measure gender equality, each indicator is to be calculated separately for men and women. The specification "by sex" is not repeated in the name of the indicator.

[4] United Nations General Assembly. Follow-up to the tenth anniversary of the International Year of the Family and beyond. Report of the Secretary-General. 29 November. A/66/62–E/2011/4.

[5] United Nations General Assembly. Preparations for and observance of the twentieth anniversary of the International Year of the Family in 2014. Report of the Secretary-General. 11 November. A/67/61–E/2012/3.

[6] Where a supporting indicator exists without reference to a headline indicator, it is numbered corresponding to a "dummy" headline indicator. For example, indicator 1.4.1 is a standalone supporting indicator. Following this numbering system, headline indicators always have duplex numbering, and supporting indicators have triplex numbering.

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
Poverty			
1.1	A country's most commonly used poverty indicator	—	A1, A2
1.1.1	A country's most commonly used poverty indicator, by age	—	A1, A2
1.1.2	A country's most commonly used poverty indicator, by household type	—	A1, A2
Relative poverty			
1.2	At-risk-of-poverty-rate	—	A1, A2
1.2.1	At-risk-of-poverty-rate, by age	—	A1, A2
1.2.2	At-risk-of-poverty-rate, by household type	—	A1, A2
Absolute poverty			
1.3	Rate below basic-needs level	—	A1, A2
1.3.1	Rate below basic-needs level, by age	—	A1, A2
1.3.2	Rate below basic-needs level, by household type	—	A1, A2
1.4.1	Proportion of people living below the 'one-dollar-a-day' level	—	A1, A2
Material deprivation			
1.5.1	Proportion of people living in households who lack at least four out of nine EU-items on material deprivation	—	A1, A2
Education			
Enrolment			
2.1	Tertiary gross enrolment rate	23, 24	B1
2.2	Upper secondary gross enrolment rate	22, 24	B1
2.3.1	Lower secondary net enrolment rate	22, 24	B1
2.3.2	Primary net enrolment rate	21, 24, 27	B1, L4
Lifelong learning			
2.4.1	Lifelong learning	—	B3, B6
Graduation			
2.5	Graduation rate in tertiary education	—	B1
2.6	Share of female graduates in science, engineering, manufacturing and construction	25	B3, B4, L4
2.6.1	Share of female graduates in science, engineering	—	B3, B4, L4
2.6.2	Share of female graduates in manufacturing and construction	—	B3, B4, L4
2.7	Graduation rate in upper secondary education	—	B1
2.7.1	Graduation rate in lower secondary education (ISCED 2)	29	B1
Level of education and literacy attained			
2.8	Distribution of 25-64 years old, by highest level of education attained	31	B1
2.8.1	Distribution of 30-34 years old, by highest level of education attained	—	B1
2.8.2	Literacy rate of persons aged 15-24 years	—	B2

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
Others			
2.9	Young people (aged 18-24) not in employment and not in education and training	—	B2
2.10	Proportion of females among third level teachers or professors	26	B4, L4
Health			
Health Status			
3.1	Healthy life years at birth	—	C1, C2
3.1.1	Causes of mortality (death rate): • cerebrovascular disease • ischaemic heart disease • circulatory system disease • suicides • motor vehicle accidents • external causes of injury • poisoning and accidents by age group	42	C1, C2
3.1.2	Infant mortality rate	—	C1, C2
3.1.3	Maternal mortality rate	34	C1, C2
3.1.4	Prevalence of HIV/AIDS, 15-24 year olds	39	C1, C2
Determinants of health			
3.2	Smoking prevalence	37	C2
3.2.1	Smoking prevalence , by age group	37	C2
3.3	Proportion of adults overweight or obese	38	C2
3.3.1	Proportion of adults overweight or obese, by age group	38	C2
Violence			
Physical violence			
4.1	Rate of women/men aged 15-49 years, subjected to physical violence in the last 12 months	Similar to 48, 49	D1, D2
4.1.1	Rate of women/men aged 15-49 years, subjected to physical violence in the last 12 months, by frequency (every day or nearly every day, once or twice a week, once or twice a month, less than once a month), severity and sex of perpetrator	Similar to 48, 49	D1, D2
4.2	Rate of women/men aged 15-49 years, subjected to physical violence during lifetime	—	D1, D2
4.2.1	Rate of women/men aged 15-49 years, subjected to physical violence during lifetime, by frequency (once, few times, many times), severity and sex of perpetrator	—	D1, D2
Sexual violence			
4.3	Rate of women aged 15-49 years, raped in the last 12 months	Similar to 48, 49	D1, D2

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
4.4	Rate of women aged 15-49 years, raped during lifetime	—	D1, D2
Psychological and economic violence			
4.5.1	Rate of women/men aged 15-49 years, subjected to psychological violence in the past 12 months by the intimate partner	—	D1, D2
4.6.1	Rate of women/men aged 15-49 years, subjected to economic violence in the past 12 months by the intimate partner	—	D1, D2
Violence by the partner			
4.7	Rate of ever-partnered women/men aged 15-49 years, subjected to sexual and/or physical violence by current or former intimate partner in the last 12 months	Similar to 48, 49	D1, D2
4.7.1	Rate of ever-partnered women/men aged 15-49 years, subjected to sexual and/or physical violence, by frequency (every day or nearly every day, once or twice a week, once or twice a month, less than once a month) and severity	Similar to 48, 49	D1, D2
4.8	Rate of ever-partnered women/men aged 15-49 years, subjected to sexual and/or physical violence by current or former intimate partner	—	D1, D2
4.8.1	Rate of ever-partnered women/men aged 15-49 years, subjected to sexual and/or physical violence, by frequency (once, few times, many times) and severity	—	D1, D2
4.9	Rate of women/men aged 15-49 years, killed by an current or a former partner in the last 12 months	—	D1, D2
Stalking			
4.10	Rate of women/men aged 15-49 years, who have been stalked, by stalking behaviour	—	D1, D2
4.10.1	Rate of women/men aged 15-49 years, who have been stalked, by type of perpetrator (current partner, former partner, other known person, unknown person) and sex of perpetrator		D1, D2
Under reporting			
4.11	Rate of women/men aged 15-49 years, subjected to sexual and/or physical violence who did not report the crime to the authorities/to the police	—	D2
Violence in childhood			
4.12.1	Rate of women/men subjected to sexual violence in childhood (occurring before sixteen years old)	—	D1, D2

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
Economy			
Labour force participation			
5.1	Inactivity rate	3	F1, F2
5.1.1	Inactivity rate, by age	3	F1, F2
5.1.2	Inactivity rate, by reason for inactivity	3	F1, F2
5.1.3	Inactivity rate, by family context	3	F1, F2
Employment			
5.2	Employment rate	—	F1, F2
5.2.1	Employment rate of 25-64 year-olds, by sector of the economy	—	F1, F2
5.2.2	Employment rate of 25-64 year-olds, by family context	—	F1, F2
5.3	Status in employment (employees, own-account workers, employers and family workers)	4, 5, 6	F1, F2, F5
5.3.1	Status in employment (employees, own-account workers, employers and family workers), by family context	4, 5, 6	F1, F2, F5
5.4	Minimum number of occupations that account for half of the total employment	—	F1, F2, F5
5.5	Hourly gender pay gap	13	F1, F2
5.5.1	Hourly gender pay gap, by education	13	F1, F2
5.6	Proportion of employed working part-time	14	F1, F2
5.6.1	Proportion of employed working part-time, by age, family context	14	F1, F2
5.7	Proportion of employed in time-related underemployment	—	F1, F2
5.7.1	Proportion of employed in time-related underemployment, by family context and age of youngest child	—	F1, F2
5.8	Informal employment of workers in the non-agricultural sector	9	F1, F2, F5
5.8.1	Informal employment of workers in the non-agricultural sector, by family context	9	F1, F2, F5
5.9	Unemployment rate	10	F1, F2
5.9.1	Unemployment rate, by age	10	F1, F2
Entrepreneurship			
5.10	Proportion of employed who are employers	7	F1, F2, F5
Unpaid work and work-life balance			
5.11	Proportion of workers working over 50 hours per week	—	F1, F2, (F5), F6
5.11.1	Proportion of workers working over 50 hours per week, by family context	—	F1, F2, (F5), F6
5.12	Average hours spent in total work (paid and unpaid work)	2	F1, F2, F6
5.12.1	Average hours spent in total work (paid and unpaid work), by family context	2	F1, F2, F6

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
5.13	Average hours spent in unpaid work[7]	1	F1, F2, F6
5.13.1	Average hours spent in unpaid work, by type of unpaid work and family context	1	F1, F2, F6
5.14	Employment rate of 25-49 year-olds	15	F1, F2, F6
5.14.1	Employment rate of 25-49 year-olds, by age of youngest child	15	F1, F2, F6
5.15	Proportion of children under age three in formal care	16	F1, F2, F6
Power and decision-making in society			
Representation of men and women in different social decision-making roles			
6.1	Female legislators, senior officials and managers (% of total)	—	G1, G2
6.1.1	Women's share of ambassadors	—	G1, G2
6.1.2	Women's share of central bank board members	—	G1, G2
6.1.3	Women's share of constitutional court members	—	G1, G2
6.1.4	Women's share of core ministers		G1, G2
6.1.5	Women's share of government ministers	43	G1, G2
6.1.6	Women's share of heads of universities	—	G1, G2
6.1.7	Women's share of journalists	—	G1, G2
6.1.8	Women's share of judges	47	G1, G2
6.1.9	Women's share of members of municipal councils or other local area governing bodies	—	G1, G2
6.1.10	Women's share of members of national parliament	44	G1, G2
6.1.11	Women's share of managerial positions	45	G1, G2
6.1.12	Women's share of police officers	46	G1, G2
6.1.13	Women's share of researchers	—	G1, G2
6.1.14	Women's share of senior level civil servants	—	G1, G2
6.1.15	Women's share of governing bodies of the Labour Confederations	—	G1, G2
6.1.16	Women's share of governing bodies of the Employer Confederations	—	G1, G2
Power and decision-making in the household			
Organisation of household finances, work, and participation in other household decision-making			
6.2	Percentage of women in a co-residential partnership who state that their partner or spouse manages all the money and gives them their share	—	—
6.3	Percentage of women in a co-residential partnership who state that their partner or spouse always or usually makes decisions in the household on the following issues: • large household purchases • routine household purchases • the time she spends in paid work • way of child raising (for couples with children only)	—	—

[7] Housework and child/family members care, unpaid family work

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
	• social activities		
6.4.1	Percentage of women's incomes on partners[8] incomes	—	—
6.5.1	Percentage of women's time spent in unpaid work on partners time spent in unpaid work[9]	—	—
Media			
Media Use			
7.1	Proportion of individuals using mobile/cellular telephones	18	J1
7.2	Proportion of individuals using the Internet (both weekly, and over last 3 months)	17	J1
Stereotypes and portrayal of men and women			
7.3.1	Attitudes of women and men, with regard to the following opinions: • When parents are in need, daughters should take more caring responsibility than sons • If a woman earns more than her partner, it is not good for the relationship • On the whole, men make better political leaders than women • Women should be able decide how to spend money without asking partner • When jobs scarce, men more right to job than women	—	J2
Environment Representation of women amongst environmental scientists and decision-making bodies			
8.1	Proportion of women among government representatives to climate change decision-making bodies at the international level	—	K1
8.2.1	Proportion of women tertiary graduates of total graduates (ISCED levels 5 and 6) in natural sciences and technologies	—	K1
Children and adolescents			
Early marriage and sexual activity			
9.1	Number of 20-24 year old women who were married before age 18	51	L2, L3, L9
9.2	Proportion of young people aged 15-19 years who had sex before age 15	—	L2, L3, L5
9.3	Adolescent fertility rate (15-19 years olds)	52	L2, L3, L5
Self-esteem or self-image			
9.4.1	Percentage of underweight adolescents (15-19 year-olds)	—	L2, L3, L5
Violence in childhood			
9.5.1 (also 4.12.1)	Rate of women/men subjected to sexual violence in childhood (occurring before sixteen years old)	—	L3, L7, L9, (also D1, D2)
9.6.1	Female genital mutilation	50	L1, L2, L3,

[8] Dual earners

[9] Housework and child/family members care, unpaid family work

Indicator number	*Indicator*	*Relevant global min set indicator*	*Relevant BPA strategic objective*
			L5, L7, L9
9.7.1	Child discipline	—	L2, L3, L7, L9
Demography			
10.1.1	Sex ratio for total population	—	Multiple domains
10.1.2	Sex ratio for population aged 65 and over	—	Multiple domains
10.1.3	Life expectancy at birth	—	Multiple domains
10.1.4	Life expectancy at age 65	41	Domain C
10.1.5	Infant mortality rate	—	Domain C
10.1.6	Mean age at first marriage	—	Multiple domains
10.1.7	Mean age of women at birth of first child	—	Multiple domains
10.1.8	Total fertility rate	—	Multiple domains

III. Issues requiring further work

A. Proposals for enhancing the Gender Statistics Database of the United Nations Economic Commission for Europe

22. It would be desirable to update the contents of the UNECE Gender Statistics Database so that it includes all the headline indicators proposed here. This may involve some degree of modification or rationalisation of existing data tables, where the proposed indicators differ from those already available.

23. The feasibility of collecting data on those headline indicators that are currently not represented in the UNECE Statistical Database needs to be investigated. This has to consider:

(a) Availability of such data in other international databases and periodicity of their updating

(b) Resources available to the UNECE Statistical Division for maintaining and collecting the additional data

(c) Response burden to national statistical organizations

(d) Feasibility to collect data retroactively to achieve the same kind of time series as with the existing data in the UNECE Database.

B. Methodological and data issues

24. The following areas have been identified as meriting further methodological work, which are grouped according to the relevant section heading.

1. Poverty

25. The difficulty in the measurement of poverty necessitates further work on the following issues:

- Inclusion of social transfers in kind in income estimates (e.g., the Canberra concept of income);
- Creation of meaningful measures of poverty that take into account the financial (in)dependence of people, other than measures at household level, and considering how to get more detailed breakdowns (by sex, by sex and age, by sex and household type) of existing poverty indicators. The lack of other than household-level measures of poverty is a particular impediment in measuring the gender differential in poverty;
- Combining of income, and consumption and wealth measures, following the completion of the work of the OECD Expert Group on Income, Consumption and Wealth.

2. Violence

26. In addition to the violence indicators defined in this paper, further work is required in some aspects that are insufficiently considered from the perspective of more developed countries. These indicators concern reporting behaviour, stalking and violence in childhood.

(a) Reporting

27. The violence that is not reported to authorities was among the topics considered by the Friends of the Chair of the United Nations Statistical Commission on Statistical Indicators on Violence against Women. They exchanged views on the importance of obtaining data on unreported physical and sexual violence, as the reasons for not reporting vary widely according to certain characteristics of the victim or the perpetrator, which has great implications for policy formulation.

28. The Friends of the Chair group decided that this issue would be better addressed as an additional variable, rather than an independent indicator. Consequently, they introduced it as a dimension, at the same level as frequency and severity, to be collected for the four indicators on physical and sexual violence. Nevertheless, in order to point out a minimum set of recommended indicators, we chose to consider a single indicator on the underreporting.

(b) Stalking

29. Stalking is a relevant phenomenon within the framework of violence against women. It is a type of violence itself and it is a strong predictor for further and severe violence.

30. We strongly recommend defining a stalking indicator; even if there will be some difficulties in identifying consistent definitions. Some countries have different national legal definitions, but our aim is to give a statistical definition that represents well the persecution behaviour.

31. Stalking can be described as persecutory behaviour that frightens the victim and can assume different forms: unwanted gifts, unwanted contacts (e.g., trying to talk to a woman in a nagging way against her will, repeatedly asking for an appointment to meet her, waiting for her outside home or at school or at the workplace, sending messages, phone calls, e-mail, mails) and other forms of control (following or spying on her). Stalking can be from anyone, but the most severe form is the stalking that happens in the framework of an intimate relationship, generally from a former partner around the time of separation. Nevertheless, recent studies have shown that stalking is also frequent by other persons (other than partners) and for this reason, stalking by anyone should also be collected.

(c) Sexual violence in childhood

32. Violence in childhood is an important topic to study as well as a significant predictor of violence suffered in adult life. It is very difficult to carry out surveys regarding violence in childhood and to survey young people and children at the time violence occurred. Therefore, retrospective strategies can be used and an indicator can be the percentage of women sexually abused before age 16. This indicator is used in many countries, because it is easier to tell ex-post the childhood violence experience, rather than to speak about it at the time of occurrence.

33. The Friends of the Chair group considered pertinent to make a clear distinction between indicators on current child abuse and adult women who were abused in their childhood. It concluded that only the latter falls within the scope of its mandate and agreed to limit it to sexual violence, given that physical violence during childhood is not necessarily associated with gender.

(d) Health

34. Many of the indicators identified in this section are based on basic health issues, developed to guide progress in developing countries. For the CES member countries, some of these issues have strong policy relevance while others do not.

35. The review of potential indicators did not identify an indicator that considers the role of a country's health system in determining health outcomes. Many of these indicators lacked relevance or widespread availability in CES member countries. The most relevant indicators among those identified considered access to health care issues and unmet health care needs. However, such indicators would require further methodological work in order to be considered in this indicator set. Other indicators related to issues that may affect developed health systems such as polypharmacy could further be considered in this area.

36. Further work should also look at developing comparable indicators across CES member countries that address more sophisticated health policy areas, such as monitoring disabilities, mental illnesses and long-term health conditions that can impact on the human function. Health determinants typical for developed countries, such as lack of physical activity, could also be considered in an indicator set for the CES member countries.

(e) Power and decision-making in society

37. The source(s) of the proposed indicators for the representation of women and men in governing bodies of the labour confederations and employer confederations have not yet been identified. Since these mirror the indicators proposed within the EU indicators for the BPA, it is expected that the source for these indicators will be subsequently established for EU countries. No such mechanism is yet known for other CES member countries.

(f) Power and decision-making in the household

38. Further work on establishing a robust statistical indicator of gender equality related to decisions to have children would be of merit, given the importance of this issue to the CES member countries, both in terms of those constraints external to the family (e.g. income, childcare), and in terms of decision-making between partners. Such work would be especially useful if it led to the creation of suitable indicators on gender equality in this respect.

39. Additionally, given that the proposed indicators in this domain are from the Generations and Gender Surveys (GGS) that have limited coverage of Eastern Europe, the Caucasus and Central Asia, it would be advantageous to investigate whether proxy indicators for these indicators could be obtained from Demographic and Health Surveys

(DHS), Multiple Indicator Cluster Surveys (MICS) or the European Values Study[10] (albeit that the long time interval between surveys would preclude this from being the main source of data for the indicators).

(g) Institutional mechanisms for the advancement of gender equality

40. The European Institute for Gender Equality (EIGE) is pursuing the development of indicators on institutional mechanisms for the advancement of gender equality. Once completed, it would be useful to review the report to identify whether the indicators proposed could also be adopted beyond EU countries.

(h) Media

41. The European Institute for Gender Equality has undertaken methodological work on indicators for the Media domain. This includes women's representation in media organisations and related bodies, such as non-executive boards and regulatory bodies.

42. Once this work is completed, it would be useful to consider whether the definitions proposed in this regard could be employed beyond EU countries, taking into consideration the possibility that media-related decision-making may be structured differently in non-EU countries.

43. With regard to the topic of gender attitudes and stereotypes, more work and empirical testing is required to see how a robust index of gender attitudes could be constructed based on the items currently available from the Generations and Gender Surveys (GGS). Alternatively, one or two of the attitudes could be selected to represent the dimension of gender stereotypes.

(i) Children and adolescents

44. The BPA objective L6 "Eliminate the economic exploitation of child labour and protect young girls at work" is not addressed due to the lack of available data on both child labour and child domestic work. Some data on child labour exists, but it is not disseminated at the country level and does not take into account unremunerated domestic work. Given the international interest in this topic and its high policy relevance, we see this as an area where further methodological work and data collection would be useful.

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[10] http://www.europeanvaluesstudy.eu

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Gender equality indicators

Summary of comments on the report on indicators of gender equality

Note by the Secretariat

Summary

The present note summarizes the comments by members of the Conference of European Statisticians (CES) on the report on indicators of gender equality, provided in the electronic consultation in January-March 2014.

A total of 36 replies were received, from 30 countries and 6 international organizations. The comments showed broad support for the report and its proposed indicators. Countries and organizations also provided detailed comments on specific issues, which are summarized in this document.

The Conference is invited to discuss the report in the light of the comments summarized in this document. The Task Force on Indicators of Gender Equality will revise the report and present it for endorsement to the October 2014 meeting of the CES Bureau.

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I. Introduction

1. The present note summarizes the comments by members of the Conference of European Statisticians (CES) on the report on indicators of gender equality, provided in the electronic consultation in January-March 2014.

2. In addition to the CES-wide consultation, the UNECE secretariat organized a workshop of gender statistics experts for discussing the availability and suitability of the proposed indicators in Geneva on 17-18 March 2014. Focusing on countries of Eastern Europe and Central Asia, the workshop recommended some modifications to the set of proposed indicators.[1]

3. The Task Force on Indicators of Gender Equality will consider the material presented in this document as well as the recommendations of the workshop for revising its report by the October 2014 meeting of the CES Bureau.

II. Summary

4. The CES Task Force on Indicators of Gender Equality consisted of members representing Australia, Israel, Italy, Netherlands, Portugal, Spain, the United Kingdom, the European Institute for Gender Equality (EIGE), the European Commission (Eurostat), International Labour Office (ILO) and the United Nations Economic Commission for Europe (UNECE).

5. Following the electronic consultation of the members of the Conference of European Statisticians, responses were received from the following 30 countries and 6 organizations: Austria, Belarus, Brazil, Canada, Czech Republic, Denmark, Finland, France, Georgia, Hungary, Israel, Kazakhstan, Latvia, Lithuania, Mexico, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Slovakia, Slovenia, Sweden, Switzerland, the former Yugoslav Republic of Macedonia, Ukraine, United Kingdom, United States, Eurasian Economic Commission, the Interstate Statistical Committee of the Commonwealth of Independent States (CISSTAT), Eurostat, *Institut de recherche pour le développement* (IRD, France), Organisation for Economic Co-operation and Development (OECD) and the Unesco Institute of Statistics (UIS).

6. Many countries expressed support for the recommendations and welcomed the initiative to harmonize and systemize gender indicators (Austria, Canada, France, Kazakhstan, Lithuania, Republic of Moldova, Slovakia, Sweden, Switzerland, Ukraine, United Kingdom, CISSTAT and Eurostat). For example, **Canada** commented that the report represented a thorough and significant effort to develop a consistent framework for measuring gender equality, whilst the **United Kingdom** noted the particularly challenging nature of the work that the task force had undertaken.

7. Detailed comments are summarized in sections III-VI.

[1] The report of the workshop is available at the UNECE web site at http://www.unece.org/stats/documents/2014.03.genderworkshop.html

III. General comments

A. Approach taken in the work

8. Brazil said that the report succeeded in making an extensive review of international agreements and systemising relevant information on indicator selection. Canada said that the indicators were well rationalised. Ukraine felt that the approach to the selection of indicators was "necessary and sufficient" to monitor gender equality at national and international levels.

9. Hungary, Poland and Switzerland felt a greater emphasis was placed on issues related to women than to men (for example child custody), whereas Mexico commented that indicators should emphasise inequalities rather than underlining differences between men and women.

10. Regarding the indicator selection criteria, Latvia felt that the proposed indicators complied entirely with these criteria, whilst Austria did not. France considered that the proposed violence indicators went beyond the objective of using existing sources of indicators.

11. Hungary suggested that the UNECE countries should not all be treated the same way in the selection of indicators given the differing national circumstances.

12. The United States and Romania suggested that indicator availability might be given more weight in the selection of indicators. However, Belarus and the Czech Republic indicated that they monitor indicators from the global minimum set of gender indicators[2], which account for nearly half of the total number of indicators proposed. Switzerland welcomed that existing indicator sets were used.

13. The United States suggested that the approach to selecting indicators could mirror the approach used to choose the global minimum set of gender indicators, in terms of having different tiers of indicators, which, *inter alia*, considered availability. OECD indicated that the report could make better use of the results of the OECD Gender Equality Initiative, particularly with regard to measuring entrepreneurship.

B. Number of indicators and their availability

14. Austria and Portugal commented that there were a large number of indicators recommended, although many other countries suggested the inclusion of additional indicators (see section V).

15. A number of other comments highlighted data availability issues for certain indicators in their country or region (Austria, Portugal, Czech Republic, Hungary, Lithuania, Romania, Slovakia and Eurostat). Most of these comments related to the absence of victimisation surveys for measuring violence (Czech Republic, Hungary, Latvia, Lithuania, Romania and Eurostat), particularly due to regulatory obstacles to the implementation of the European Statistics on Safety from Crime survey. Similar comments were received regarding indicators derived from time-use surveys (Lithuania, Slovakia and the United Kingdom) and Generations and Gender Surveys (Finland and Romania).

16. Support was received for violence indicators derived from victimisation surveys (Kazakhstan) and for more indicators from time-use surveys (Portugal). Belarus said that it would conduct a time-use survey in 2014-2015.

[2] Gender statistics: report of the Secretary General. Annex II: Minimum set of gender indicators, United Nations 2012. E/CN.3/2012/19

C. Sources of indicators

17. France praised the way the Task Force focused on existing databases as sources of indicators, and Sweden supported this approach to reduce the burden placed on NSOs to provide figures for these indicators.

18. Latvia felt that greater use could have been made from the online Eurostat database as a source of indicators; however, Portugal suggested some indicators might be too heavily reliant on EU data (e.g. the EU-SILC survey). Poland suggested greater reference to the indicators developed by the European Institute for Gender Equality (EIGE).

D. Indicator definitions and comparability

19. Several countries (Austria, Czech Republic, Portugal and Romania) expressed a need for further definition of indicators, or consideration of comparability of indicators calculated from different sources of data.

E. Other comments

20. Hungary suggested that greater consideration be made of differences within countries (for example in migrant communities).

21. CISSTAT requested that the report be translated into Russian.

22. Canada felt that the decision not to propose a domain explicitly containing indicators of human rights left a gap regarding access to cultural and sporting activities.

IV. Comments on the structure

23. The comments received regarding the structure of the report were overwhelmingly positive.

24. The report was described as logical (Canada), transparent (Czech Republic, Slovakia), explicit (Finland), comprehensible (Switzerland), well-established (the former Yugoslav Republic of Macedonia), well-organised (Brazil), sensible (United Kingdom), clear and well structured (Portugal).

25. Hungary felt the report to be too detailed, whilst the United States described it as comprehensive.

26. Views varied on whether the consideration of indicators should belong within an annex or in one of the main chapters of the report: Eurostat supported the current structure, whereas Romania felt that it should constitute one of the main chapters of the report.

27. Eurostat and Finland supported having the summary of proposed indicators at the beginning of the report, right after the Introduction chapter, although Romania suggested that this should be placed in an annex. Brazil suggested splitting the further work chapter by domain, and dispersing it across the different sections of the annex, according to subject area. Canada suggested an additional annex containing details of the strategic objectives of the Beijing Platform for Action.

28. Hungary commented that some domains are more detailed than others, and that the indicators should be more balanced between them. The United States commented that some domains (such as violence) had a greater proportion of headline versus supporting indicators than other domains.

29. Poland highlighted the difference between the domains chosen for the proposed indicators compared to those of the global minimum set of gender indicators. Whilst the United States felt that there was close alignment in general between this set of indicators, the Beijing Platform for Action and the global minimum set, they suggested dissolving the

domains on power and decision-making, and scattering their indicators across the other domains.

30. Mexico suggested a number of minor edits to the text of the document, and greater use of bullets in the document.

V. Comments on the proposed indicators

31. A summary of comments related to the proposed indicators are given by domain in the following subsections:

A. Poverty

32. Finland felt that the proposed indicators are realistic, ready to be implemented and in line with the existing indicator systems. Latvia had doubts about the suitability of indicators of relative and absolute poverty, given the anomalous effect that the economic crisis had had in reducing some of these measures of poverty. Instead, Latvia recommended an indicator that measured the population at risk of poverty or social exclusion, which it considered more robust.

33. Kazakhstan and the Russian Federation were cautious about calculating sex breakdowns of poverty measures, and suggested further work in this area. The Russian Federation highlighted the importance looking not just at the receipt of income by the household, but also at the way it is distributed among household members. Belarus already produces sex breakdowns of absolute poverty as well as age and household type breakdowns. Mexico wanted the proposed household type breakdown categories to be clarified.

34. Many comments were received in relation to the indicators of material deprivation. Hungary commented that the definition of material deprivation (according to the Eurostat definition) was now out of date. It also pointed out that our recommendation to measure material deprivation based on the absence of 4 out of 9 items represented severe material deprivation, as opposed to simply material deprivation. Latvia also suggested that severe material deprivation could be used as a basic-needs indicator.

35. Belarus, Canada and Hungary raised questions about the list of items used to define material deprivation. Canada questioned the relevance of some of the items outside of the European Union countries, while Hungary suggested having different item lists for different countries. Belarus uses a different list of items than the EU list, which they feel characterises poverty in their country well. Hungary suggested including housing deprivation within the material deprivation indicator, along with ownership of a computer with internet connection.

36. Canada suggested an additional indicator on financial stress due to individual and/or household debts, whilst CISSTAT suggested that a four dollars per day measure of absolute poverty would be more relevant for CIS countries than one dollar per day.

B. Education

37. France agreed with the selection of education indicators since the Task Force had examined existing sources of these indicators. The Czech Republic and Hungary also reported having high levels of availability of these indicators.

38. Regarding the indicator on literacy, Hungary and the UIS did not feel that this was relevant to more developed countries, and UIS suggested the alternative measure of functional literacy, subject to its availability across UNECE countries.

39. Hungary questioned the relevance to the education domain of the indicator on young people not in employment and not in education and training.

40. Latvia suggested including the gender parity index of the gross enrolment ratio for each level of education, whilst the UIS suggested adding subject-specific indicators from PISA surveys.

41. Regarding lifelong learning, Latvia suggested that some further work be done on how this indicator is defined.

42. UIS also suggested some editing changes to references to the global minimum set of Gender indicators.

C. Health

43. The Czech Republic and Hungary commented that data for those indicators derived from health surveys (such as smoking habits) were not available with high frequency.

44. Regarding the indicator on healthy life years, Portugal expressed concerns about the international comparability of this measure due to cultural relativity. Belarus also stated that it did not currently have available data for this indicator.

45. Canada suggested adding an indicator on mental or psychological health, while Latvia suggested an indicator on self-reported unmet health needs, from the SILC survey. The Czech Republic suggested the following additional indicators:

(a) Number of notified cases of tuberculosis by sex,

(b) Number of physicians and dentist by sex

(c) Development of cost structure per sickness-insured person

D. Violence

46. Several comments mentioned the lack of a violence survey in their country or region (Czech Republic, Hungary, Latvia, Lithuania, Romania and Eurostat). Belarus would have difficulty producing retrospective indicators.

47. The United States noted that differences exist between the proposed indicators and those recommended for the global minimum set of indicators. They further commented that there was an excessive number of headline indicators in this domain, and suggested moving some indicators (such as on female genital mutilation) from the domain on children and adolescents, into the violence domain.

48. France felt that the restriction of the scope of the violence indicators to gender-based violence was problematic for a number of reasons, including conceptual reasons, and in terms of data availability. To address this issue, they suggested first including some indicators on general violence (e.g., homicide) before narrowing the focus to indicators of gender-based violence.

49. The United States suggested separating the physical and sexual aspects of violence in indicators on violence by the partner.

50. Canada commented that harassment was an important part of violence that had not been captured within the proposed indicators.

51. France and Latvia commented on the indicator of stalking. Latvia considered this indicator to be somewhat subjective, and therefore of limited international comparability. The description should be modified to exclude stalking by current partners for conceptual reasons. France highlighted the lack of international data availability and comparability, commented that it does not satisfy the report's indicator selection criteria (based on conceptual clarity and comparability and suggested dropping it.

52. Regarding indicators on rape, Sweden commented that paragraph 232 of the report apparently gives a general definition of rape, which seems to contradict earlier statements

about the importance of listing acts that are carried out, instead of definitions. Sweden considered this problematic, given the differing legal definitions of rape in different countries, and the different acts that may or may not be included depending on the jurisdiction in question.

53. On psychological violence, the United States noted that this indicator was restricted to psychological violence from partners. However, family members could also be a source of this form of violence. Mexico asked for clarification on the types of perpetrators included in some indicators, whilst the United States wanted explicit descriptions of the types of perpetrators included in the denominators of indicators.

54. Kazakhstan and Mexico asked for clarification of the requirement to conduct victimisation surveys for both men and women. Mexico raised concerns about the secrecy of the questions, and the requirement to sample only one person per household.

55. The former Yugoslav Republic of Macedonia considered further investigation of the possibility of using administrative data for some of the violence indicators.

56. Several countries spotted a drafting error concerning the source of indicators on homicide, which should be from administrative sources, rather than from a survey.

E. Economy

57. Hungary commented that the indices already present in the UNECE gender database represented a better selection of indicators for the economy domain than those that had been proposed by the Task Force.

58. Regarding indicators on time-use, Lithuania, Slovakia and the United Kingdom commented on the limited availability of time-use survey data with which to compute these indicators. However, Slovakia pointed out that some of these indicators (on hours of paid and unpaid work) could be obtained from Labour Force Surveys.

59. Regarding the gender pay gap, Latvia expressed support for this indicator, and its breakdown by education; Hungary felt that an occupation breakdown should have also been included. Slovakia and Poland commented that the Labour Force Survey was not a suitable source of data for the gender pay gap, instead recommending the Structure of Earning Survey.

60. Slovakia cautioned against recommending indicators (or breakdowns) that would lead to an expansion of the Labour Force Survey, due to the difficulties that would be encountered in its implementation. Belarus highlighted the absence of variables in its Labour Force Survey for calculating the age of youngest child.

61. Finland and Hungary were cautious about having an indicator on time-related under-employment. Hungary, Poland and Portugal expressed doubts about the indicator on the minimum number of occupations that accounted for half of male/female workers, calling for clearer definition and additional information.

62. Regarding informal employment, Hungary and Poland highlighted difficulties in obtaining this data, while Finland asked for further clarification of the definition of this indicator.

63. Hungary pointed out that our entrepreneurship indicator on the proportion of employed who are employers, is already contained within the employment indicator on status in employment.

64. Mexico requested clarification of whether the indicator on workers working over 50 hours per week included unpaid work, and asked whether the indicator on unpaid work included unpaid family work.

65. Latvia suggested adding an indicator on in-work at risk of poverty, while the Czech Republic stressed the importance of measuring long-term unemployment.

F. Power and decision-making in society

66. The United States pointed out that the proposed set of indicators for power and decision-making in society were more elaborate than those of the global minimum set. At the same time, a number of suggestions were received from other countries for additional indicators.

67. The Czech Republic suggested an indicator on women in the army, by their rank, whilst Portugal suggested an indicator on women in religion within this domain.

68. UIS suggested additions in relation to academic staff by grade and by subject area, and on male and female heads of higher education institutions and board members.

69. Belarus commented on the limited relevance of some indicators (journalists and governing bodies of employer confederations), while the Czech Republic highlighted limited data availability regarding managerial positions, and decision-making in the TV and in the Radio.

70. Brazil suggested cross-referencing the indicator on the number of journalists in the Power and decision-making and Media domains.

G. Power and decision-making in the household

71. Hungary commented that the proposed indicators appear more like survey variables than indicators.

72. Belarus indicated that income data was available at household level, rather than individual level.

H. Media

73. Belarus and Romania commented on the unavailability of indicators derived from the Generations and Gender Survey. Romania further suggested that the subdomain on stereotypes of men and women should be transferred to the domain on Power and decision-making in the household.

I. Environment

74. Canada felt that the scope of the environment domain did not fully reflect all of the issues raised in this area of the Beijing Platform for Action, and suggested consideration of environmental volunteering, or sustainable household practices – either within this domain or in the domain on power and decision-making in the household.

J. Children and adolescents

75. Latvia highlighted the difficulties on collecting data on the number of 20-24 years married before age 18, while Switzerland felt that the rationale for excluding an indicator on allocation of food to children highlighted a bias towards females.

K. Demography

76. IRD suggested adding the sex ratio at birth to the list of indicators, given its relevance to certain UNECE countries.

VI. Proposals for further work

77. In the consultation, CES members were asked to comment on the proposals for further work identified by the Task Force, concerning (1) updating of the UNECE Gender

Database and (2) methodological work on the measurement of gender equality in poverty, violence, health, power and decision-making, media, and children and adolescents.

A. Addition to the UNECE Gender Database

78. Belarus, Lithuania, Mexico, Sweden, Switzerland, Ukraine and CISSTAT support the add to the UNECE Gender Database the headline indicators proposed by the Task Force. CISSTAT particularly supports database expansion with regard to topics of poverty, health and environment. The former Yugoslav Republic of Macedonia proposes to improve the production and dissemination of relevant gender statistics.

79. Austria, Finland and Mexico suggested that database redevelopment should not overburden statistical offices. Finland suggested obtaining as much data as possible from the Eurostat online database. Mexico and CISSTAT commented that this work should take account of metadata.

80. Austria and Ukraine suggested further investigation of data availability for the indicators in international sources. Ukraine saw the database redevelopment as being an important step in ensuring international consistency of gender equality data.

B. Further methodological work

81. Hungary and Mexico supported the proposed methodological work. Brazil suggested further analysis looking at the return to education, for example in relation to the gender pay gap, broken down by personal attributes. Kazakhstan supported further work on health or indicators of constraints of life, and suggested further work on the methodology for measuring entrepreneurship. Latvia proposed further work to be undertaken on comparability of indicators, and on definitions of lifelong learning and vocational education and training. The United Kingdom Equality and Human Rights Commission suggested further work in the area of human rights indicators.

82. Finland, Latvia and Switzerland highlighted the challenges related to the methodological work on measuring poverty and social transfers. France and Eurostat noted the challenges related to the reporting of violence and the measurement of stalking.

VII. Proposal

83. The Conference is invited to discuss the report in the light of the comments summarized in this document. The Task Force on Indicators of Gender Equality will revise the report and present it for endorsement to the October 2014 meeting of the CES Bureau.

United Nations ECE/CES/2014/5

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Item 6 (b) of the provisional agenda
Climate change related statistics

Recommendations on climate change related statistics

Note prepared by the Task Force

Summary

The document is an extract from the draft recommendations on climate change related statistics. It provides the executive summary, introduction and main conclusions of each chapter of the draft recommendations. In addition, it includes the full chapter on recommendations on climate change related statistics.

The recommendations were developed by a Task Force on Climate Change Related Statistics chaired by Canada. The Bureau of the Conference of European Statisticians reviewed the full text of the recommendations in January 2014, supported the draft recommendations and decided to submit them to the 2014 plenary session of the Conference.

The full text of the recommendations has been sent to all members of the Conference for electronic consultation. Subject to positive outcome of the consultation, the recommendations will be submitted to the 2014 plenary session of the Conference of European Statisticians for endorsement.

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I. Executive summary

1. This report presents recommendations for improving the statistics related to climate change collected by national statistical systems and enhancing their utility for the compilation of greenhouse gas inventories. The recommendations were developed by the Task Force on Climate Change Statistics at the request of the heads of the national statistical offices of the member states of the United Nations Economic Commission for Europe and other countries that participate actively in the work of the Conference of European Statisticians. The Bureau of the Conference of European Statisticians established the Task Force in November 2011. The report primarily addresses data that are already collected as part of official statistics and that can support analysis or research related to climate change. The report also serves as a tool for discussion with producers of climate information outside the national statistical system. The report does not focus on scientific or meteorological data on changes in weather and climate.

2. In June 2012, the Rio+20 Conference on Sustainable Development emphasized climate change as an immediate and urgent global priority. This has increased the pressure to provide new information to support analysis of climate change and improve existing statistics. The Task Force organised two expert meetings to explore user needs and existing practices within national statistical systems and to review its draft recommendations.

3. In drafting its recommendations, the Task Force analysed the results of an earlier survey of the involvement of national statistical offices in climate change related statistics and carried out interviews of users of climate information, including the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change, research agencies, non-governmental organizations and universities.

4. The Task Force defined climate change related statistics as:

Environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to these consequences.

5. To narrow the focus of work for official statistics, the report presents recommendations in areas where the national statistical offices and other members of national statistical systems can contribute with concrete actions.

6. National governments in most developed countries have for many years published information on greenhouse gas emissions through a well-established reporting process guided by the United Nations Framework Convention on Climate Change. Statistical offices often provide source data for the inventories, whereas the compiler is usually outside the national statistical system. Official statistics on climate change are less well developed, though several statistical offices have started to work in this direction. Climate change related data are scattered across a variety of organisations and are largely unstructured. The wide range of existing official environmental, social and economic statistics could be much better utilized for climate change policy and analysis.

7. The report recommends that national statistical offices work more closely with greenhouse gas inventory producers to ensure that official statistics meet the needs of greenhouse gas inventories. Given the considerable amount of statistical data required for the inventories, it is recommended that national statistical offices be recognized as formal entities in the greenhouse gas inventory systems in all countries. This could be done simply by explicitly noting the role of the national statistical office in the inventory documentation submitted to the United Nations or via a Memorandum of Understanding between the national statistical office and the national entity responsible for the inventory. It would be

beneficial as well to create national working groups around greenhouse gas inventory compilation and other climate change related statistics.

8. It is recommended that national statistical offices start improving climate change related statistics gradually and based on their key competencies. First, existing environmental, social and economic statistics should be better organised for the purposes of climate change analysis; for example, official statistical dissemination channels could be better used to provide climate change researchers and decision makers with access to them. As a second step, the usefulness of the existing statistics for climate change analysis should be improved by reviewing existing data collection systems. In this context, the Task Force underlines the importance of linking existing datasets to improve their coherence and maximize their potential for climate change analysis. Third, development of new statistics may be considered; for example, on the underlying driving forces of climate change, on its social and economic impacts, on mitigation efforts and on vulnerability and adaptation.

9. National statistical offices should act as the facilitator for inventory compilers within the national statistical system; for example, by assessing the usefulness of existing official statistics for inventory compilers, by reviewing the statistical requirements related to the Kyoto protocol and other global or regional climate change agreements and by preparing themselves to meet new data requirements. International statistical organizations should also contribute by engaging in processes around international climate accords and the global greenhouse gas inventory system.

10. The Task Force realizes that taking action on the points above will challenge the infrastructure of national statistical systems. Reviews of standard classification systems, registers, definitions and survey methods will all be required to ensure the usefulness of official statistics for climate change analysis. So too will be finding new ways to ensure confidentiality of official statistics while providing climate change analysts with increased access to microdata.

11. Statistical systems will need to acquire new kinds of expertise through training, recruitment and, especially, through partnerships with other producers and experts. In the longer run, organizational changes may be required in national statistical offices to support the production of these statistics that cut across the statistical system.

12. The Task Force's recommendations are the first ever developed to help national statistical offices improve climate change related statistics and enhance their support to greenhouse gas inventories. While the recommendations represent useful first steps, further international work will be required to support their implementation. To this end, an international forum could be established to share good practices, improve collaboration, discuss priority data needs, discuss a key set of climate change related statistics and identify areas for further methodological work. The global nature of climate change calls for wider cooperation among users and producers of statistics to better respond to the growing information needs. Statistical standards and guidelines need to be agreed at the international level to ensure comparability and efficient use of resources. International statistical organizations (for example, the Conference of European Statisticians and its secretariat) should ensure cooperation with the United Nations Framework Convention on Climate Change, the International Panel on Climate Change, the World Meteorological Organisation and others.

II. Introduction

13. These recommendations aim at improving the statistics related to climate change collected by national statistical systems and enhancing their utility for the compilation of greenhouse gas emission (GHG) inventories. While this report is aimed primarily at official

statisticians, it also serves as a tool for discussions with those outside national statistical systems who are producers and users of climate change related statistics.

14. The recommendations were developed by the Task Force on Climate Change Statistics at the request of the heads of the national statistical offices of the member states of the United Nations Economic Commission for Europe (UNECE) and several other countries that participate actively in the work of the UNECE Conference of European Statisticians (CES). The Bureau of the Conference of European Statisticians established the Task Force in November 2011. The Task Force consisted of experts from the statistical offices of Canada (Chair), Finland, Italy, Mexico, Norway, Qatar and the United Kingdom, as well as the European Environment Agency (EEA), Eurostat, the Directorate-General on Climate Action of the European Commission (DG-CLIMA) and UNECE who provided secretariat support for the Task Force. The following experts participated on the Task Force: Robert Smith (Canada, Chair), Leo Kolttola (Finland, Vice Chair), Martin Adams (EEA), Enrique de Alba (Mexico), Julio Cabeca (Eurostat), Helen Champion (United Kingdom), Ricardo Fernandez (EEA), Angela Ferruzza (Italy), Julie Hass (Norway), Jesarela Lopez (Mexico), Tiina Luige (UNECE), John Mackintosh (United Kingdom), Michael Nagy (Qatar), Brian Newson (Eurostat), Rolando Ocampo (Mexico), Adriana Oropeza (Mexico), Anu Peltola (UNECE), Velina Pendolovska (DG-CLIMA), Giovanna Tagliacozzo (Italy), Stefano Tersigni (Italy) and Angelica Tudini (Italy).

15. The work is a step towards taking data needs related to climate change more fully into account in national statistical systems and improving the contribution of official statistics to analysing climate change related phenomena.

16. The United Nations Statistical Commission (UNSC) carried out a programme review on climate change and official statistics in 2009. The review was based on a paper by the Australian Bureau of Statistics and the outcome of two conferences on this topic held in 2008. As an outcome of the review, the UNSC recognised there is an important role for national statistical systems in filling data gaps related to climate change and emphasized the need for better understanding of the data requirements of stakeholders.

17. In view of these developments, the CES Bureau decided in 2011 to take stock of the current state of work on climate change related statistics in national statistical offices (NSOs) and asked UNECE to conduct a survey among member countries of the UNECE and the OECD. The survey was carried out with the support of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) and the United Nations Statistical Division (UNSD) in New York. The purpose was to find out the extent to which the NSOs are involved in producing climate change related statistics and to identify issues of common concern for further work at international level. The survey covered 69 countries reaching beyond the UNECE region. Of the 48 countries which replied, 37 reported involvement in work related to greenhouse gas inventories and 18 compiled other statistics related to climate change. The survey respondents called for international efforts to consider how the data available in national statistical systems could be made more useful for the purposes of climate change analysis and policy making. They also noted that analysis of climate change across all its dimensions would benefit from the linkage of climate change data, often produced outside of the national statistical system, with official statistics on the environment, society and economy. While the survey provided evidence that such linkages are already being made, it showed that there is clearly room for improvement.

18. Most national statistical offices reported currently providing data on economic activities to the compilers of greenhouse gas emission inventories. These so-called "activity data" include energy, industry, agriculture, forestry, transport, international trade, land use and land cover, wastewater and waste statistics. About one quarter of statistical offices also reported taking part somehow in the emissions calculations in addition to providing data.

19. To identify practical steps to support future development of climate change related statistics and enhance the role of official statistics in greenhouse gas inventories, the CES Bureau established the Task Force on Climate Change Related Statistics in November 2011 (terms of reference for the Task Force are provided in Annex 1). The Task Force was asked to start its work by assessing the gaps between user needs and available statistics and defining the scope of climate change related statistics. It was asked to collaborate with other bodies involved in related international work, including the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC), the European Commission's Directorate General for Climate Action (DG-CLIMA), Eurostat, the European Environmental Agency and the United Nations Statistics Division (UNSD). Regular progress reports were submitted by the Task Force to the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA).

20. The Task Force aimed to identify areas where improvements are most needed and where national statistical systems can best contribute with concrete actions. The Task Force paid special attention to recommendations related to making existing statistics more easily available to users and to identifying the highest priority statistical gaps that must be filled. Its work focused on six topics:

(a) Defining the scope of "climate change related statistics" and testing different frameworks and models for this purpose.

(b) Analysing user needs for climate change related statistics in both the policy and scientific domains to determine where the most pressing needs exist. This was done by conducting stakeholder interviews and by carrying out desk studies on the data needs for emission inventories and climate policies.

(c) Reviewing existing statistics of relevance to climate change and comparing those against the needs. The results of the survey of statistical offices was analysed to identify existing statistics and gaps.

(d) Analysing the relationships between NSOs and agencies responsible for greenhouse gas inventories to find opportunities for strengthening their cooperation.

(e) Reviewing the statistical infrastructure, such as standards, classifications and methods, used to report on climate change related statistics. The Task Force examined the existing infrastructure in NSOs in order to identify gaps and recommend priorities for improving this infrastructure.

(f) Identifying practical steps and priorities for future development of climate change related statistics so that they would better meet user needs.

21. The Task Force organized two expert meetings on climate change related statistics for producers and users. The first meeting was held on 19-20 November 2012 in Geneva. The meeting explored user needs for climate change related statistics and took stock of what statistical offices are doing in the area. It also discussed the definition of the scope of climate change related statistics. The conclusions of the meeting provided valuable input to the Task Force's work.

22. The Task Force organised a second meeting on 8-9 October 2013, again in Geneva, to discuss a draft version of the Task Force's report and its recommendations. The meeting brought various producers and users of climate change information together in order to t ke into account their views and expectations with regard to official statistics and climate change.

23. The Task Force was asked by the CES to prepare a report to review the current state of climate change related statistics and the possibilities to develop and streamline the work, with a proposal for:

(a) Developing climate change related statistics for evidence-based climate change policies: concrete steps and priorities for further work

(b) Harmonising and streamlining the work of NSOs on the greenhouse gas inventories.

24. This report presents the results of that effort. Section III provides the conclusions of Chapter 1 of the full report which discusses the definition and scope of climate change related statistics that the Task Force used in its work.

25. Section IV provides the conclusions of the Chapter 2 of the full report which focuses on the relationship between official statistics and GHG inventories. It discusses gaps between the needs of inventory compilers in ideal terms and what national statistical systems are currently able to provide are discussed.

26. Section V provides the conclusions of the Chapter 3 of the full report which focuses on climate change related statistics other than those required for GHG inventories. The section provides conclusions on user needs related to climate policies and climate change analysis, and existing statistics and gaps.

27. Section VI provides the conclusions of the Chapter 4 which addresses challenges of the statistical infrastructure of NSOs as coordinators of the development work to be done in the national statistical systems for climate change related statistics. National statistical systems are organised in different ways across countries. Therefore, the analysis is based on the most common roles, practices and data of national statistical systems in the UNECE countries.

28. The report concludes in with Section VII which equals Chapter 5 of the full report providing the Task Force's recommendations for the improvement of climate change related statistics. Practical examples and priorities for the implementation of these recommendations at the national and international levels are also considered.

III. Conclusions on the scope of climate change related statistics

29. The need to measure climate change has spurred the development of a wide variety of data. To identify how statistical systems could better respond to the need for climate change related statistics, it is first necessary to define the scope of such statistics. The Task Force devoted considerable discussion to this issue in particular, through the above examination of different frameworks and approaches used in the compilation of environmental statistics and also through evaluation of user needs. As a common feature to all frameworks and approaches examined, they suggest the need to measure the factors that are the cause of climate change, the consequences of climate on human and natural systems and the efforts of humans to avoid climate change and live with the consequences.

30. The conclusion of these discussions is that as climate change impacts the environment and society through complex interactions and cause-effect relations, the conceptually based definition of climate change related statistics would necessarily be wide and exhaustive. Climate change touches upon a broad range of human activities – from energy use to transportation, waste generation, agriculture, manufacturing and tourism etc. Indeed, few human activities are not related somehow to climate change, either as a contributing factor or via an impact. Climate change influences a wide range of natural phenomena: rainfall, temperatures, ocean and air currents and ecosystems that have an impact on human activities.

31. In the very broad sense, the Task Force defines the scope of climate change related statistics to include:

Environmental, social and economic data that measure the human causes of climate change, the impacts of climate change on human and natural systems, the efforts of humans to avoid the consequences as well as their efforts to adapt to these consequences.

32. Whereas climate change is multi-disciplinary and anchored largely in the natural sciences, the statistical system is focused largely on anthropomorphic or human systems and provides data for administrative regions within national boundaries.

33. A broad definition is, therefore, only a starting point for statistical offices wishing to improve climate change related statistics. A pragmatic approach is needed to narrow the scope to those areas where the statistical system's involvement is most valuable. These are areas where the links between human and natural systems are most important in terms of understanding climate change – both from the point of view of its causes and its impacts. Evaluation of impacts requires interpretation and judgement in some cases. The focus of official statisticians is therefore on what can be measured in support of analysts' efforts to identify and assess the impacts of climate change. It is not the task of NSOs to assess the impacts but to provide the data for doing so.

34. To narrow the scope in the context of the statistical system, the Task Force decided to distinguish between climate change related statistics and climate change statistics in general. The latter would include data that measure climate and weather directly; for example, temperature and precipitation. These data are frequently, but not always, collected and analysed by agencies outside of the statistical system; for example, by meteorological organizations. The focus of the Task Force was on climate change related statistics. That is, environmental, social and economic statistics that measure climate change related:

(a) Emissions: GHG emissions and their human causes

(b) Drivers: human causes of climate change that deal with sources of emissions

(c) Impacts: impacts of climate change on human and natural systems

(d) Mitigation: efforts of humans to avoid the consequences

(e) Adaptation: efforts to adapt to these consequences

35. The first two groups, greenhouse gas emissions and drivers, describe causes of climate change. The latter three – impacts, mitigation and adaptation – describe the consequences of climate change. The first two groups, GHG emissions and their drivers, are discussed in Section IV while the others are discussed in Section V of this paper.

IV. Conclusions on greenhouse gas inventories and official statistics

36. The statistics that could be used as the basis of GHG inventories need to be examined to determine if the current statistics adequately cover the data needs of the main users namely, the inventory compilers, reviewers and analysts. Improving NSOs' contribution to inventory compilation could start by drafting, with the inventory compilers, a list of national priorities and a road map on country-specific data gaps and development needs for inventories. According to the analysis of user needs and existing NSO data, the key gaps from inventory compilers' viewpoint include knowledge of what data would be available from the statistical system and access to these data at the required level of disaggregation. From the inventory reviewers' viewpoint, the quality of some source data should be improved to match inventory data requirements. Often this refers to data on waste, energy, land use and forestry. From analysts' viewpoint, gaps exist especially in

timeliness of data, length of time series, access to disaggregation data and possibilities to link emissions with other statistics.

37. NSOs should be more aware of how the data of national statistical systems are or could be used for the compilation of greenhouse gas inventories. The Task Force has, therefore, provided a table following the example of the United Kingdom that NSOs can use to track which data could be sourced from the national statistical system (see Annex 4). Information on what data are needed would help NSOs to better organize their work and optimize the availability of data from national statistical systems for the purposes of emission inventories. NSOs should inform stakeholders about how the data of national statistical systems could be used for inventories and in relation with the inventory data.

38. The statistical system needs to be involved in discussions regarding data quality so they can focus on important improvements in the activity data. The IPCC regularly analyses the quality of the countries' inventories, and NSOs should look closely at the Inventory Review Reports to see if there are improvements needed in the basic statistics or the way they are used. The statistical data used to build the inventories should be considered part of the core of NSOs' work on climate change related statistics. NSOs can always initiate these quality improvements for the data falling within their mandate. NSOs could also have a wider role to play in the area of quality assurance of GHG inventories even in areas where their data are not used. This could, in fact, be a natural entry point to increased involvement by NSOs in GHG inventories. In the UNECE survey, the majority of NSOs thought it would be beneficial to discuss how NSOs could contribute to the UNFCCC Measurement, Reporting and Verification (MRV) approach to inventory compilation.

39. It is unlikely that the methodological or classification differences between GHG inventories and official statistics would be changed in the short term. Yet, they increase the workload as inventory compilers need to reclassify and recompile existing data, and in some cases similar data needs to be collected twice. Data consistency problems could be overcome by describing the differences between inventory data and official statistics, developing standardized tools such as correspondence tables, and explaining the differences by using reconciliation items. This would enable analysts to undertake integrated analysis of the economic, social and environmental aspects of GHG emissions. Emission inventories have especially important links with the system of national accounts, environmental accounting, air emissions and energy statistics.

40. NSOs could also work with inventory compilers to make activity data available at an earlier stage to help develop timelier emission estimates as opposed to the current 17-18 months' lag, or they could develop early estimates of GHG emissions using monthly and quarterly data sources that would not be comprehensive enough for actual GHG inventories. This would help more effectively inform climate change mitigation polices. Longer time series would also be needed for analysing drivers of emissions.

41. NSOs can also support the analysis of emission trends by providing background socio-economic data. Some examples of such data include population, fuel prices, GDP and gross value added (GVA) by branch/industry breakdown, national energy balances, and heating/cooling degree days. Furthermore, NSOs are well placed to contribute to analysing emissions by economic sectors, using energy statistics or developing accounts similar to air emissions for other sectors with relevance to climate change.

42. The overwhelming conclusion drawn from the evidence available to the Task Force is that there is a clear need for involvement of NSOs in emission inventory compilation. The benefits to the inventory process will be that this makes greater use of the knowledge NSOs have of the underlying datasets, whilst also benefiting from the high public trust afforded to NSOs as professionally independent producers of statistics. It would help

reduce parallel and sometimes duplicating reporting systems and unnecessarily high costs of data collection and respondent burden.

43. The existing data requirements under the UNFCCC and the Kyoto Protocol are well established already and significant changes are unlikely in the short term. NSOs should, therefore, adjust their work to existing guiding frameworks for GHG inventories. At the same time, NSOs should follow up on upcoming changes in data requirements, especially concerning activity data, energy statistics and energy balances. Experts from NSOs could help to evaluate whether the needed inventory source data are available or may be developed at reasonable cost. Methodological developments need to be based on what data are realistically available and not impose unreasonably high costs on inventory compilers, statistical systems or respondents.

V. Conclusions on climate change related statistics (other than greenhouse gas inventories)

44. Climate change related statistics comprise a very broad range of data that stretch across the entire statistical framework. Most official statistics are not collected specifically for climate analysis and, therefore, NSOs must better understand user needs in order to effectively direct their efforts in this domain. Data gaps must be identified together with the main users of climate change related statistics.

45. In general, the media and the public lack easy access to key climate change related statistics that are easy to understand. Policy makers' data needs are reflected in international climate accords, protocols and monitoring mechanisms. Their focus is shifting more and more towards analysis of the socio-economic impacts of climate change and to monitoring the effectiveness of adaptation and mitigation activities. The scientific community and analysts require access to detailed data, often microdata that has been geo-referenced.

46. Producers of climate change related statistics outside of the statistical system could help serve user needs if they had easier access to and better knowledge of official statistics. Statistical systems already produce a considerable quantity of data relevant for climate change. NSOs are well positioned to collect, coordinate, harmonize and disseminate climate change related statistics. A step-by-step approach should be adopted in facing this challenge: 1) facilitating access to the existing statistics; 2) improving the quality and usefulness of existing data from different domains; and 3) developing new statistics to fill priority data gaps.

47. Facilitating access to existing statistics means bringing together and disseminating existing data that are relevant for climate change analysis. Decision makers would benefit from having a portal of key climate change related statistics at their disposal. NSOs should lead the work of developing such portals. It is not necessary to physically bring together all data. Simply facilitating access to them would be a valuable contribution; for example, a meta-database of climate change related statistics found within and outside of the statistical system could be produced. NSOs provide quality assurance for official statistics, but they cannot certify the quality of official statistics produced outside the statistical system. This does not mean that NSOs should not facilitate access to all data relevant for climate change, but they can help promote improvements in the coherence and reliability of data produced by others.

48. Improving the usefulness of existing data for climate change analysis requires reviewing data collections and improving data linking across different statistics and producers' datasets. It entails a review of existing statistics and data collection systems to

see if they can be used to identify climate change related issues, such as relevant information on renewable energy sources, green jobs, new or recurrent diseases linked to climate change etc. In some cases small adjustments to data collections may improve the value of the collected data for climate change analysis notably, and they could lead to smarter use of the limited resources. NSOs' capacity in linking datasets produced by various organizations should also be strengthened. Data matching requires not only better technical capacity, but sufficient legislative environment for closer cooperation with other data producers and gradually a higher degree of data harmonization.

49. NSOs should determine what additional statistics might be needed in the longer term for climate change analysis. For example, NSOs should consider how to contribute to monitoring the impact of climate change on biodiversity and ecosystems. Reliable data on the use of economic instruments in mitigation efforts will be needed. Regular statistics should also be developed to monitor adaptation; including, resilience, risks and vulnerability of population groups and the preparedness to withstand the adverse impacts of climate change.

50. NSOs will need further guidelines on how to take into account the needs of climate change analysis in official statistics. For this, the links of the existing statistical frameworks to climate issues should be explored further. In the longer run, methodological guidelines for data collection and compilation on climate change related statistics should be developed.

51. A number of countries have developed national climate change adaptation strategies, based on various indicators sets to inform public environmental policies. Development of a set of key climate change related statistics should be internationally coordinated to achieve comparability across countries. In the longer term, high relevance areas for climate change related issues should be defined and provided as official statistics regularly.

VI. Conclusions on statistical infrastructure

52. For better collaboration, NSOs should have a contact person who would be in charge of coordinating GHG inventory source data issues, collaborating with the inventory compilers and keeping up with the outcomes of the UNFCCC conferences of the parties to better understand and prepare for the associated data requirements. Establishing a working group involving the inventory compiler and producers of official statistics that provide data for the inventories would be helpful.

53. Legislation has a crucial role in supporting production of emission inventories and cooperation among agencies. National legislation should facilitate effective cooperation between agencies belonging to the national emission inventory system and provide a legal basis for access to and exchange of data as required for the inventories.

54. The possibilities to improve the relationships between the concepts and classifications should be examined at the international level. For possibilities to build relationships with the UNFCCC, UNECE Protocol on the Pollutant Release and Transfer Registers (PRTRs), World Meteorological Organisation (WMO) and IPCC, NSOs would have to be represented by an international entity, such as the Conference of European Statisticians.

55. The Task Force acknowledged the need for capacity building especially, but not only, in countries who have not yet produced annual GHG inventories. There are currently no recognized good practices for NSO role in GHG inventory compilation as their role varies across countries and there is no forum for sharing experience on the topic. It would

be in the interest of both NSOs and inventory compilers to consider what these good practices would be.

56. Improvements in the current infrastructure of NSOs are required, such as balancing between detailed data needs and confidentiality; reviewing different statistical frameworks and standards; and in the longer term adjusting organizational structures to support production of cross-sectional statistics.

57. The High-level Group (HLG) for the Modernization of Statistical Processes and Services calls for flexibility of statistical organisations so that they would be agile to provide statistics according to user needs, at an acceptable cost. Cross-sectional statistics, such as climate change related statistics, may pose challenges to the structure and functioning of NSOs. Thus, producing climate change related statistics may be easier to undertake in an organization focused on serving the needs of different user categories and producing outputs by re-sorting and combining the collected data to match the user needs.

58. Statisticians will need to build new kinds of expertise for producing climate change related statistics. This includes building capacity to produce geo-referenced data; learning new methods of spatial statistics; improving the ability to match data from multiple sources; and building substantive knowledge in climate issues. More than anything else, closer networking with organizations involved in climate issues would be helpful.

59. The production of climate change related data lacks coordination. The users of climate data would benefit from better harmonization of concepts, classifications, methods and quality standards. NSOs role is to lead the way in the harmonization and standardization of statistical production and to ensure high-quality information produced, following common guidelines. Currently, such guidelines do not exist for most climate change related statistics other than GHG inventories. In some areas, the existing practices need to be promoted among the involved agencies.

VII. Recommendations

60. This section introduces the Task Force's recommendations for improving climate change related statistics and enhancing their support to greenhouse gas inventories. The recommendations are grouped as follows: 1) recommendations on the data needed for greenhouse gas inventories; 2) recommendations on other climate change related statistics; and 3) recommendations on statistical infrastructure required for this work. At the end of the section, the Task Force suggests an agenda for further work at international level.

61. The recommendations are based on the Task Force's own discussions and on the following:

(a) A UNECE survey of national statistical offices (48 countries replied) on their involvement in climate change related statistics and greenhouse gas inventories

(b) Stakeholder interviews with users of official statistics in matters related to climate change

(c) Discussion of the interim recommendations by the Bureau of the Conference of European Statisticians (CES) in February 2013 and the CES plenary session in June 2013, and a written consultation of the interim recommendations in June-July 2013 among CES members

(d) Feedback from two expert meetings: on 19-20 November 2012 to discuss the initial findings and to identify directions for future and on 8-9 October 2013 to review the draft recommendations.

62. In February 2013, the Bureau of the Conference of European Statisticians stressed the need for urgent action by statistical offices to fill gaps related to climate change. It is hoped, therefore, that the recommendations below will be discussed and acted upon as a priority by NSOs.

A. Recommendations related to supporting greenhouse gas inventories

63. The following recommendations suggest, first, working at the national statistical system to improve data for GHG inventories; second, collaborating at the wider national level with the inventory compilers; third, creating a dialogue at the international level between the "statistical" and the "climate" communities. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 1: NSOs must improve data and statistics required for GHG inventories; including, energy, industry, transport, agriculture, waste, forestry and land-use statistics. To harmonize and streamline their work on GHG inventories, NSOs may wish to consider the following issues and actions:

(a) NSOs should be more aware of how the data of national statistical systems are or could be used in GHG inventories to be able to take into account the related data needs. The national inventory reports submitted to the UNFCCC by GHG inventory compilers in each country and annual inventory review reports prepared by UNFCCC expert teams are important sources of information for NSOs to identify needs for data improvement.

(b) Currently, existing NSO statistics are not used to their full potential for emission inventories and some duplication of data collection exists between NSOs and other organizations. Increasing awareness of existing statistics is necessary to avoid this duplication of work. As the coordinator of the national statistical system, NSOs should promote better awareness of existing data in the national statistical system and how they can be used for GHG inventories. Official statistics should be the backbone of the inventories and additional data collection should be carried out only where official statistics cannot be used. NSOs, together with other agencies, need to ensure that inventory calculations use existing statistics as much as possible. This, in turn, would improve the quality of GHG estimates and consistency with other statistics.

(c) NSOs should take the initiative in improving quality of statistical data used for GHG inventories.

(i) Improving coherence of GHG inventories and official statistics where possible by: Clarifying the emission categories used in the UNFCCC Common Reporting Format (CRF) tables that are the basis for national inventory reports as compared to statistical classifications. Recompiling GHG emissions data from national inventory reports according to the International Standard Industrial Classification (ISIC/NACE) to bring them into closer line with other statistics. Adjustments are currently being made to the CRF categories that may bring them towards using a logic that is closer to ISIC. Developing standardized tools for comparison of official statistics and inventory data, such as correspondence tables. Explaining the differences between GHG inventories and official statistics by using reconciliation.

(ii) Given the importance of good quality energy balances to underpin GHG inventories, particular emphasis should be put on improving the quality of energy statistics and the related inventory data. Energy statisticians (whether in NSOs or other organizations) should aim to improve the quality of energy statistics and balances and to ensure the consistency of activity data used in GHG inventories with

the energy balances reported to international organizations (for example, to Eurostat and International Energy Agency (IEA)).

(iii) Several countries report the need to address data gaps or quality issues, especially on waste, agriculture, land use and forestry, the production of heat and electricity for own use and from renewable energy sources.

(iv) GHG inventory analysts would benefit from improved timeliness of activity data, including energy balances. Given the competence of NSOs in producing time series data, they could help develop longer time series for analysing the inventories; for example, data related to the drivers of emissions.

Recommendation 2: NSOs should be proactive in reaching out to national GHG inventory compilers and, ideally, they should be considered official institutions in the national systems of greenhouse gas inventories in all countries. The Kyoto Protocol provides the legal basis for the design of these national systems. Specifically, NSOs may wish to develop their role and involvement in GHG inventory compilation along the following lines.

(a) Considering that NSOs provide a considerable portion of the statistics required for GHG inventories, NSOs should have a clear role in providing statistics, assisting in calculations as needed and with quality assurance. This should be established through official agreements; for example, by including NSOs in the national systems responsible for GHG inventories. This could be done simply by explicitly noting the role of the NSO in the inventory documentation submitted to the UNFCCC or more formally via a Memorandum of Understanding between the NSO and the national entity responsible for the inventory. This would provide certainty about the roles and responsibilities of each institution and closer co-operation would help improve the quality of GHG inventories.

(b) Facilitating the collaboration of the national inventory compilers with the statistical system would be part of the NSOs' role as the coordinator of the national statistical system. Therefore, NSOs should be aware of the data needs of and be actively engaged in the national inventory system.

(c) Working with inventory compilers to identify and evaluate statistics needed for emission inventories would help see if the statistics are fit-for-purpose. This work could be started by drafting, together with the inventory compilers, a prioritized list of national data gaps and a road map on data development to improve official statistics for GHG inventories. Development of NSOs' statistics should be prioritized based on where effective changes can be made in each country.

(d) It may be beneficial to create a national working group consisting of the NSO, inventory compilers and other relevant organisations belonging to the national statistical system. The objective would be to share information, review existing statistics, identify overlaps and areas for synergies and discuss challenges. The longer term goal would be to reduce costs, avoid duplicate data reporting, improve consistency and move towards multipurpose data systems serving various user needs.

(e) The experience of NSOs in quality assurance would be useful in supporting the efforts at strengthening the quality of GHG inventory. The European Statistics Code of Practice and the UN Fundamental Principles of Official Statistics form a clear institutional context for compiling objective and impartial statistical information that could be applied to GHG inventories. NSOs could use the approach of data confrontation to compare inventory results with other statistics to reveal unexpected results in the inventories. Such an approach is often useful in revealing errors.

Recommendation 3: The international statistical community should take an active role in contributing to the global GHG inventory system. The standards, classifications and methods of greenhouse gas inventories and official statistics are developed and agreed upon in international processes. Therefore, a better dialogue among international organisations, including international statistical organizations, working on climate issues would be beneficial. The international statistical community and the NSOs may wish to consider the following issues and actions:

(a) Seeking closer collaboration between international statistical organizations (for example, the UNECE Conference of European Statisticians and its Secretariat and the UN Statistics Division) and UNFCCC, IPCC, UNECE Protocol on PRTRs, WMO, International Renewable Energy Agency (IRENA), International Institute for Applied Systems Analysis (IIASA) and others. Better interaction at this level could help, for example, to ensure that inventory method development takes into account the availability of data and to avoid development of methods that require data that are not generally available in most countries.

(b) Following up on the outcomes of the UNFCCC conferences of the parties to the convention. This would help reduce the costs of the global system and improve the quality of inventories. The statistical community can add value by assessing data availability and feasibility of requirements related to the Kyoto Protocol, and by preparing themselves for possible new data requirements.

(c) The 17th UNFCCC Conference of the Parties in Durban launched a new negotiation (the Durban Platform) that foresees a single new international agreement beyond 2020 that would bring all major emitters, developed and developing, under the same legal framework. Involving NSOs from the beginning in countries that will enter this framework over the coming years could help to avoid creating overlapping data reporting systems.

(d) Actively collaborating with UNFCCC review teams to engage more effectively with UNFCCC, UNECE Protocol on PRTRs and the IPCC work. This collaboration would offer insight into how official statistics could be better used in GHG inventories.

(e) The existing international network of NSOs could also help exchange experience on NSO's contribution to the quality of GHG inventories; for example, through expert meetings, newsletters and other communications tools.

B. Recommendations on climate change related statistics (other than greenhouse gas inventories)

64. The following recommendations suggest, first, facilitating access to data that already exists; second improving the existing data for climate change analysis; and after that developing new statistics based on a review of key data needs in each country. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 4: NSOs must improve the contribution of official statistics to climate change analysis. One of the first steps should be facilitating access to existing statistics within the national statistical system. To do this, NSOs may wish to consider the following issues and actions:

(a) Creating national forums for discussions between producers and users of climate change related statistics; for example the meteorological agencies and the scientific community. These discussions would help NSOs identify their most relevant existing statistics and most urgent needs for new statistics.

(b) Promoting the use of the existing official statistics for the purposes of climate change analysis. If stakeholders have knowledge of existing data, duplication of data collection activities will be avoided.

(c) Using NSOs' dissemination channels to provide access to climate change related statistics. This may include also data not produced by the NSO (for example, scientific data). At the moment, statistics needed for understanding the causes and consequences of climate change are scattered across various organizations. Creating a "portal" for climate change related statistics as part of NSOs' dissemination channels would make them more accessible and easier to use. The portal would be an entry point to data and metadata on a wide range of existing data and statistics with relevance to climate change. This would require cooperation with scientific organizations. Meteorological services, for example, have long time series of data on climatic variables (temperature, precipitation, etc.) that could be provided with the data of national statistical systems.

(d) Considering new approaches to preserving confidentiality of respondents' data to improve access to microdata for policy makers and scientists working on climate change.

Recommendation 5: The usefulness of existing environmental, social and economic statistics for climate change analysis should be improved; for example by better structuring them. To do this, NSOs may wish to consider the following issues and actions:

(a) Reviewing statistical programs and data collections from the view point of the data needs of climate change analysis; for example to see if they provide suitably detailed statistics on renewable energy, green jobs, food production, water use, health and diseases, tourism, population and population growth, among other things. In some cases, simple adjustments to data collections may improve the value of statistics for climate change analysis, leading to more efficient use of limited resources. Users could be invited to help guide these reviews to identify key needs for improvements.

(b) Addressing the difficulties in matching data from different statistical domains and the lack of coherence among data sets. NSOs should put emphasis in improving linking between socio-economic data sets and environmental data sets by means of increased methodological and operational harmonization.

(c) Geo-referencing all relevant data to support analysis of the spatial dimension of data linked to climate change. This would also improve linkage of existing data with climate change and other environmental data. A good example is the support provided by NSOs in Europe for the INSPIRE programme.

(d) Producing statistics for new geographical areas, such as coastal areas or areas prone to flooding or drought. More statistics related to urban areas and other small regions are needed especially in developing countries. Often survey samples do not provide sufficient coverage to compile small-area statistics. In some cases, it may be possible to obtain useful data from administrative sources that cover populations at a finer level of resolution than is possible with sample surveys.

Recommendation 6: NSOs should consider development of new statistics based on a review of the key data needs of climate change policy makers and analysts in their country. When considering the production of new statistics, it is important to recall the key competencies of NSOs and take into consideration the traditional boundaries of their work; for instance, NSOs do not usually compile forecasts or make judgements about cause-effect relationships. Based on the analysis presented in Chapter 3 of the full report, the key data gaps to consider include among others:

(a) Analysing drivers of climate change by considering new efforts to connect economic information to climate change related issues by developing or expanding environmental accounts that allow, for example, GHG emissions and water use to be linked with economic activities. This would facilitate multi-sectoral analyses of the drivers of climate change. The System of Environmental Economic Accounting Central Framework's (SEEA-CF) guidance should be followed in constructing such accounts. Implementing the SEEA-CF to support measurement of climate change related issues should be seen as an important strategic goal for NSOs. International statistical organisations should consider how to best support countries in the use of the SEEA-CF for the measurement of climate change related issues.

(b) Developing statistics on the use of economic instruments in climate change mitigation efforts for analysing the effectiveness of new instruments (for example carbon taxes, tradable emission permits, subsidies). The measurement of financial flows associated with the use of these instruments and the inclusion of these flows in a clear, consistent and observable fashion in government finance statistics and national accounts needs to be addressed.

(c) Developing statistics to address climate change adaptation and adaptive capacity; for example statistics measuring resilience, risks and vulnerability of population groups and societal preparedness to withstand the adverse impacts of climate change. Relevant measures include populations at the risk of natural disasters or at the risk of poverty due to climate change.

(d) Considering how to contribute to the on-going efforts to monitor biodiversity and ecosystems. Climate change is one among a range of human factors affecting ecosystems and the related goods and services. Establishing baseline estimates of ecosystems today will make the assessment of the impacts of climate change more robust. As this work falls quite far from NSOs' normal area of work, this will require cooperation with environmental protection agencies and other organizations responsible for ensuring ecosystem quality.

C. Recommendations on statistical infrastructure

65. The following recommendations suggest, first, reviewing the current statistical infrastructure to see how the needs of climate change analysis are met; second, acquiring some new capacity, knowledge, skills and partnerships; and third considering how the current organisation of work in each country supports producing climate change related statistics. Concrete steps and priorities are provided as examples for each recommendation.

Recommendation 7: Existing classification systems, registers, definitions, statistical frameworks, products and services need to be reviewed to see that needs related to climate change analysis are appropriately addressed. Furthermore, the legislative environment for producing climate change related statistics and supporting the compilation of GHG inventories may need to be assessed. The following issues and actions may be considered by NSOs:

(a) Giving consideration in future revisions of international statistical standards and classifications to the data needs of climate change analysis; for instance, by introducing changes in the System of National Accounts to improve statistics on emission trading systems following the guidelines of the IPCC/UNFCCC. The relevant classifications to be reviewed include e.g. those relating to industries (ISIC), education (ISCED), employment (ICSE), trade (SITC) and products (CPC). If these classifications allowed for climate change related statistics to be more easily identified, NSOs could more readily extract and compile new statistics from existing statistical data. Improved classifications might, for

example, enable extraction of data on climate-related education, research, jobs, "low-carbon" industries, "green" technologies, biotechnology products, and international trade flows.

(b) Identifying and addressing the obstacles to linking statistics across domains – in particular, environmental and energy statistics – both with each other and with the national accounts. Examples include reviewing differences in the concept of "energy" across statistical domains, ensuring data consistency across institutions and testing the use of supply-use and input-output data for linking industrial production to energy use and air emissions.

(c) Considering new approaches to preserving confidentiality of respondents' data while providing access to microdata for policy makers and scientists working on climate change. Protection of confidential data is assured by statistical laws in most countries and is an important prerequisite for the production of reliable official statistics. Any solutions sought must, therefore, be in line with existing legal frameworks. An approach used in some countries is to assign those elements of the GHG inventory compilation process that require the use of confidential data to the NSO. New technological solutions may be needed for providing access to more detailed data without compromising data confidentiality. This could include the use of search engine type of tools which allow making queries to microdata through the website, such as the Demographic Explorer for Climate Adaptation (DECA) tool presented in section 3.1 of the full report.

(d) Considering the inclusion of explicit references to environmental statistics, including climate change related statistics, in statistical laws when there are opportunities to revise them. NSOs may not be provided with financial resources for developing climate change related statistics without an explicit legal mandate.

Recommendation 8: Statisticians will gradually require new partnerships, expertise and ability to adopt new methodologies for producing climate change related statistics. To strengthen the available knowledge, NSOs may wish to consider the following issues and actions:

(a) Building knowledge and understanding of the natural sciences among NSO staff who, traditionally, have been professional statisticians specialized in economic and social topics. This can be achieved, largely, by partnering and collaboration with other agencies and experts, and in part, by looking beyond traditional disciplines when recruiting staff. Staff with such knowledge will be better able to communicate with experts involved in the IPCC/UNFCCC regarding, for example, the kinds of activity data that NSOs realistically can and cannot provide. It should be recognized, however, that some of the areas of GHG inventories (for example, land use) and climate change related statistics require specialized expertise that would not be sensible for NSOs to acquire. In those instances, the focus should be on acquiring the required expertise through partnering.

(b) Familiarizing staff with GHG inventory methodologies and their evolution to increase synergies between inventory compilers and official statisticians. NSO staff should, for example, understand the logic of the CRF tables and the IPCC methodologies and guidelines, as well as review the issues raised in the Inventory Review Reports regarding source data for the inventories.

(c) Developing knowledge, methodologies and tools for producing and using geo-referenced data across the statistical system.

(d) Ensuring the effective transfer of knowledge and skills among NSOs internationally. Tackling the challenges of climate change will require good quality, comparable data across a wide range of countries. A basic level of knowledge and skills in this domain will, therefore, be required in all countries.

Recommendation 9: In the longer run, organizational changes may be needed in NSOs, the national statistical system and the national system for greenhouse gas inventories to support the production of climate change related statistics. In this regard, NSOs may wish to consider the following issues and actions:

(a) Assigning, as a first step, a person or group with the primary responsibility for ensuring the quality and availability of climate change related statistics, including statistical data for GHG inventories, and establishing contacts with key users and producers of climate information.

(b) Modifying, in the longer term, the organizational structure of NSOs or the national statistical systems to support production of climate change related statistics that cut across the statistical system. According to the High-level Group for the Modernization of Statistical Processes and Services, "the challenge for statistical organizations is to be sufficiently flexible and agile to provide statistics according to user needs, at an acceptable cost." They note that crosscutting data are necessary but may pose challenges to the existing structures and functioning of NSOs.

(c) As suggested above, especially in the context of GHG inventories, changes and clarifications may be needed in the division of work and responsibilities between the different producers of climate change related data and GHG inventories.

(d) Earmarking sufficient resources for the development of environmental statistics and climate change related statistics. The modernization of statistical processes that many NSOs are targeting currently may liberate financial and human resources that could be used to meet new needs related to climate change.

D. Next steps and unresolved issues

66. The recommendations above are the first that have been developed to help NSOs improve climate change related statistics and enhance their support to the compilation of GHG inventories. They cannot, therefore, be taken to be the final word on this topic and NSOs can be expected to require further guidance to help them take account of the needs of climate change analysis and GHG inventories.

67. The Task Force suggests that guidance be provided to countries that wish to move forward in the implementation of these initial recommendations. Therefore, it is suggested that a small steering group, comprising 6-8 countries and international organizations, be established to provide on-going direction to countries wishing to move forward.

68. A longer term goal should be to define a set of key climate change related statistics. Several countries are currently developing climate change indicator sets for policy purposes. This work should be internationally coordinated to enable availability of comparable statistics across countries.

69. One of the key conclusions of the Task Force work has been the need for better dialogue between NSOs and those involved in climate change policy and analysis. During the course of its work, the Task Force established good contacts and working relationships with the IPCC, UNFCCC, UNECE Protocol on PRTRs and WMO. The members of the statistical system need to continue engaging with these organisations to further define and establish the role of NSOs and other members of the system in support of climate change policy and analysis. For this to happen, NSOs, GHG inventory compilers and relevant international organizations must continue to share ideas, good practices and areas for collaboration.

70. Therefore, the Task Force suggests establishing an international forum for discussions among the producers and users of climate change related statistics with the

participation of IPCC, UNFCCC UNECE Protocol on PRTRs and WMO as a logical next step. These partners have expressed support for forming such a forum. The forum could identify specific areas of climate change related statistics that require further methodological work. These, in turn, could be addressed by setting up focused task forces to help countries tackle the related methodological work. The Forum should be country driven and designed to facilitate:

(a) Sharing development ideas and experience, as well as good practices in climate change related statistics.

(b) Discussing collaboration, roles and division of responsibilities among the statistical community, greenhouse gas inventory compilers and the relevant international organisations.

(c) Exploring the priority data needs in climate change related statistics to enable selection of a key set of climate change related statistics.

(d) Discussing concepts and measurement frameworks to be developed for the key climate change related statistics.

(e) Identifying areas where practical methodological guidance would need to be developed for NSOs.

71. There are many unresolved issues that should be considered in order to develop climate change related statistics further. Below is a sample of some of the unresolved issues to be discussed as part of future international work on climate change related statistics:

(a) What statistics should be disseminated in climate change portals and in what level of detail?

(b) How to ensure coherence of GHG inventory data with official statistics (energy, environmental accounts, and national accounts)?

(c) How best to use SEEA-CF for the measurement of climate change related statistics?

(d) How to update existing statistical standards or classifications to better serve climate change data needs?

72. An important challenge will be to find the balance between country-specific development work and setting standards to improve quality and comparability of climate change related statistics internationally. Both will be needed – methodologies cannot be developed without country experience and research – but standards must be developed before diversified statistical practices are in place.

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Item 6 (b) of the provisional agenda
Climate change related statistics

Results of the consultation of the recommendations on climate change related statistics

Note by the Secretariat

Summary

This note summarizes the comments by members of the Conference of European Statisticians on the recommendations on climate change related statistics. The secretariat carried out the electronic consultation in February-March 2014.

A total of 41 countries and international organisations replied. All responding countries and organisations supported the endorsement of the recommendations. Respondents also provided views on the priority areas for further work, both nationally and internationally. Several countries and international organisations indicated their willingness to participate in follow-up work.

In view of the support received, the recommendations on climate change related statistics (ECE/CES/2014/5) are submitted to the Conference for endorsement.

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I. Introduction

1. This note summarizes comments by members of the Conference of European Statisticians (CES) on the recommendations on climate change related statistics. The Secretariat carried out an electronic consultation of the recommendations in February-March 2014.

2. CES members were asked to structure their comments according to a set of questions on general comments, proposals for further work and national implementation plans.

3. The following 41 countries and international organisations replied: Belarus, Canada, China, Colombia, Denmark, Finland, France, Georgia, Germany, Ireland, Israel, Italy, Latvia, Lithuania, Luxemburg, Mexico, the Republic of Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey, Ukraine, United Kingdom, the Directorate-General for Climate Action of the European Commission (DG CLIMA), Eurasian Economic Commission, European Commission Joint Research Centre (JRC), European Environment Agency (EEA), Eurostat, the Food and Agriculture Organization of the United Nations (FAO), the Interstate Statistical Committee of the Commonwealth of Independent States (CIS-STAT), the Pollutant Release and Transfer Register (PRTR), the United Nations Framework Convention on Climate Change (UNFCCC) and the World Meteorological Organisation (WMO).

II. General comments

4. All responding countries and organisations supported the endorsement of the recommendations by CES, and acknowledged the value of the recommendations as the basis for work in countries. Several countries commended the recommendations for being clear, comprehensive, balanced, sufficiently elaborated and well-structured. The following general remarks were made:

(a) National statistical offices (NSOs) should take a leading role in coordinating the production and development of official data to be used for climate change analysis, as climate change has a wide impact on people's lives, wellbeing and societal development. National statistical systems should be reviewed from the climate change viewpoint, and stakeholders should be made more aware of the uses of official statistics for this purpose (France, Italy, Luxemburg, Mexico and Ukraine);

(b) Improving national collaboration with stakeholders, in particular with those involved in producing greenhouse gas (GHG) inventories, is the key recommendation (Belarus, Colombia, France, Ireland, Israel, Italy, Latvia, Lithuania, Luxemburg, Mexico, the Republic of Moldova, Portugal, Sweden and European Commission JRC);

(c) A close dialogue between the statistical community and international organisations involved in the work on climate change related issues will be necessary for effective future work (Colombia, Finland, Luxembourg, Portugal and FAO);

(d) The recommendations provide a clear direction for development work. Steps for implementing the recommendations need to be considered and prioritised nationally in order to maximise their effect. Some recommendations can be seen as longer term goals; others serve as examples rather than strict recommendations (Finland, France, Germany, Latvia, Lithuania, Norway, Portugal, Romania and United Kingdom);

(e) The recommendations are based on making better use of existing data and their implementation can be started without notably increasing the workload of statistical offices. The recommendations could help to reduce response burden and avoid duplication of data collection (France, Israel, the Republic of Moldova, Netherlands, Norway, Poland, Portugal, Sweden and The former Yugoslav Republic of Macedonia);

(f) The recommendations provide the first response of official statistics to the increased attention to climate change and to the growing need for the related data. The report is a useful tool for collaboration both nationally and internationally (e.g. DG CLIMA).

(g) Wider geo-referencing of data and easier access to more disaggregated data would be highly valuable for adaptation and impact analysis, but also for GHG inventories, especially in the agricultural sector (European Commission JRC). National statistical offices should more widely apply new approaches to ensure respondents' confidentiality and make use of new technology in order to facilitate access to microdata for climate research purposes (Ireland, the Republic of Moldova, Netherlands and Ukraine);

III. Priorities for further international work

A. Priority issues for international work

5. All responding countries and organisations supported the proposals for further work, as presented in Chapter 5.4 of the recommendations. Some countries explicitly supported the establishment of a small Steering Group to lead the way forward (Italy, Switzerland and Turkey). The priorities identified by respondents were grouped into three areas: GHG inventories, climate change related statistics and communication, as follows:

1. Methodological work in support of greenhouse gas inventories

(a) Finding ways to improve consistency of source data for GHG inventories and further aligning the work on inventory producers and statistical offices, for example in GHG inventories, energy statistics, environmental accounts and national accounts (Colombia, France, Mexico, Poland, Sweden, Ukraine, United Kingdom and European Commission JRC);

(b) Participating in the future processes of preparing new guidelines for inventory calculations, for example for the next convention period in 2014-2015, for example with the Task Force I of the Intergovernmental Panel on Climate Change (IPCC). Reviewing the methodologies of statistical production against the IPCC tier methodologies could help to assess the usefulness and quality of official statistical data for the inventories. (Finland, Mexico, Ukraine and FAO);

(c) Reviewing the usefulness of and methods for compiling approximated greenhouse gas inventory data needs to be explored further in the context of air emission accounts (Eurostat) due to the new Regulation (EU) No 525/2013 that foresees "approximated greenhouse gas inventories" to be submitted at T + 7 months from 2015 onwards.

2. Methodological work on climate change related statistics

(a) Developing a core set of climate change related statistics that would be approved by most countries and would be internationally comparable and compiled on a regular basis. The core set should be developed in a way that leaves room for national flexibility (China, Colombia, Israel, Italy, Latvia, Norway, Slovenia, Turkey and Poland);

(b) Reviewing the current statistical classifications and statistical infrastructure from the viewpoint of climate change (Mexico and Italy). Focusing on improving the usefulness of current classifications when they are under revision (Norway and United Kingdom);

(c) Defining the priority areas of new statistics to be derived from existing data or developed from scratch. For example, identify areas where NSOs have competence, such as costs of mitigation and adaption to climate change, use of economic instruments, and in the longer perspective the state of ecosystems, health conditions and social issues related to climate changes. The work should take into account the need to reduce administrative burden, avoid duplication of effort and lower costs of data collection (Finland, France, Netherlands, Norway and Sweden);

(d) Exploring the potential use of the System of Environmental-Economic Accounting Central Framework (SEEA-CF) for deriving climate change related statistics and indicators. The issue could also be discussed with the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) and the London Group on Environmental Accounting (Israel, Luxembourg, Mexico, Netherlands, Sweden and European Commission JRC).

3. **Communication aspects**

(a) Maximising the use of existing data by developing common frameworks for organising and disseminating climate change related statistics derived from various different producers (Italy, Poland, Ukraine and United Kingdom);

(b) Promoting communication and cooperation between statisticians and various stakeholders and experts, such as climate policy makers, climate analysts, scientists and researchers to further define priority data gaps and/or clarify the borderline between official statistics and research. (Belarus, China, Colombia, Latvia, Lithuania, Luxembourg, the Republic of Moldova, Norway, Portugal, United Kingdom, Ukraine and European Commission JRC);

(c) Bringing climate change related statistics to the agenda of other international statistical meetings such as on economic statistics, employment, agriculture, trade etc. in order to present the recommendations and their links to the statistical area in question (Norway).

B. Sharing good practices at international level

6. The respondents called for sharing good practices at international level and drafting international methodological guidelines for harmonising concepts, data collection, processing and dissemination. Setting up special task forces with concrete goals would help to solve specific measurement challenges related to climate change. Support will also be needed for building the necessary statistical capacity in countries (Colombia, Finland, France, Israel, Italy, Latvia, Luxembourg, Mexico, Netherlands, Poland, Portugal, Sweden, Ukraine, United Kingdom, CIS-STAT and European Commission JRC).

7. All countries strongly supported establishing a regular expert meeting that brings together statistical offices and GHG inventory compilers with other producers and users of climate change related information. The countries and organisations considered it useful for the following tasks:

(a) Move forward to an operational phase in the implementation of the recommendations on climate change related statistics. Share good practices in implementing the recommendations and address issues faced by countries;

(b) Establish a connection between the various national producers, main users and the international expert community, including the scientific communities, for example to discuss how to involve NSOs in supporting the production of wider climate change related statistics;

(c) Facilitate discussions between GHG inventory producers and NSOs, for example to define the supporting role of NSOs towards GHG inventories. Consider how to introduce the new role of NSOs without causing problems into the functioning of the current GHG inventory system;

(d) Bring together international organisations involved in climate change related statistics to establish new partnerships, improve coordination of international work and maintain open communication, involve in particular FAO, IPCC, WMO, United Nations Population Fund (UNFPA), United Nations Statistics Division (UNSD) and UNFCCC.

(e) Reach consensus among different parties, not only statisticians, regarding future development of climate change related statistics with NSOs' support;

(f) Enlarge the discussion to further development of concepts, models, methodologies and measurement frameworks and principles of both GHG inventories and key climate change related statistics;

8. The expert meeting could start by focusing on the cooperation between the statistical community and GHG inventory compilers (Finland). The wider climate change related statistics might need to be discussed in another group as the experts of GHG are different from the experts of other climate change related statistics.

9. The United Kingdom encourages first exploring existing organisations' remits and perhaps extending them in order to find a mechanism for taking forward the recommendations on climate change related statistics.

IV. National implementation plans

A. Countries' plans and priorities

10. All countries and international organisations that replied confirmed that they plan to start implementing the recommendations after endorsement by CES. Some countries noted that lack of resources limits their possibilities to progress in this area. At the same time most countries reported on the progress already achieved. The following areas were highlighted as priorities for national work:

(a) Raising awareness of the importance of climate change related statistics within the national statistical system and with other related institutions, as well as promoting awareness of the CES recommendations among stakeholders (Italy and Mexico);

(b) Facilitating access to existing statistics (e.g. through online tools) and improving their usefulness for climate change analysis and GHG inventories before considering any new additional data needs (Netherlands and United Kingdom). Improving existing data, for example by increasing the geo-referencing of data, reviewing the length of time series, identifying the exact data needed, undertaking special analyses of available data against user needs and increasing the level of data disaggregation for GHG inventories (Colombia, Ireland, Italy, Poland, Lithuania, Netherlands and Turkey);

(c) A key priority will be to establish or continue the work of a national working group with the GHG inventory producers. Closer collaboration is expected to lead to concrete results relatively quickly if it focuses on how to rationalize the work, share

responsibilities, ensure good coordination of work and address challenges in the use of official statistical data. Statistical offices could also assist the national inventory agencies during inventory reviews when questions on data availability and quality are raised (China, Colombia, Finland, France, Ireland, Italy, Latvia, Lithuania, Portugal, Switzerland, Ukraine and FAO);

(d) A number of countries reported that they already fulfil most of the recommendations on provision of data for GHG inventories. Most noted that they plan to put more effort into developing climate change related statistics, such as those on mitigation, adaptation and impacts (Israel, Sweden, Turkey and United Kingdom);

(e) The SEEA-CF is a possible source of new indicators related to climate change. Therefore, development of new statistics should be started by analysing data that can or could be derived from the SEEA-CF. In this context, some countries are working towards producing statistics on environmental taxes and other environmental economic instruments (Israel, Luxembourg, Netherlands, Poland, Sweden and European Commission JRC);

(f) Reviewing and revising national legislation in some countries to strengthen NSOs' involvement in GHG inventories and climate change related statistics (Colombia, Portugal and Romania);

(g) Establishing direct channels for NSO's international involvement in the GHG inventory system may be useful, for example through national IPCC focal points or contacts with the technical support unit of the IPCC Task Force I. (Finland, Netherlands and Latvia)

(h) Eurostat's plans to implement the recommendations will influence national work. Eurostat will have a clear focus on the issues arising from the European Strategy for Environmental Accounting 2014-2018 and from the Regulation (EU) No 691/2011 on European environmental economic accounts. The implementation phase will focus on improving the quality and timeliness of the air emissions accounts, developing and implementing energy accounts and developing climate mitigation related statistics, for example environmental protection expenditure, environmental taxes and subsidies, environmental employment etc.;

11. Some countries explained that they cannot invest notably in the area at the moment. More human and financial resources would be needed for the statistical offices to take up this challenge. It will take time to build knowledge and competence in climate issues and data linkage, and some organizational changes may be needed to strengthen climate change related statistics and support for the GHG inventory process.

B. Support needed for countries' work

12. The CES members were asked to consider what kind of support from the international statistical community would be helpful in implementing the recommendations. The following suggestions were made:

(a) Organising expert meetings to share experience, discuss common challenges and the way forward in climate change related statistics;

(b) Conducting training seminars to share experience, build capacity in countries with developing statistical systems and engage NSOs in the process of developing GHG inventories for example in non-Annex I parties of the UNFCCC. Researchers and experts of climate change should also be engaged as resource persons in training activities;

(c) Providing bilateral support among countries. Several countries reported about their willingness to share their experience and support other countries in moving forward;

(d) Collaborating at international level (among international organisations) to agree on common standards for data and information systems thus reducing the reporting burden of national authorities;

(e) Establishing global repositories and wiki sites containing relevant methodological and training material;

(f) Translating the recommendations and other relevant methodological materials into Russian to ensure their unambiguous interpretation and wider application;

(g) Identifying sources of funding so that NSOs could engage in this work and so that regional capacity building activities could be carried out;

(h) Providing international guidance to support countries in applying the recommendations at the national level.

V. Concrete comments on issues discussed in the recommendations

13. Some countries and international organisations also provided detailed comments directly on the text of the recommendations. The comments will be reflected in the recommendations as follows:

A. Comments on recommendations related to supporting greenhouse gas inventories (Section 5.1 of the recommendations)

14. DG CLIMA and Eurostat note that the main methodology for the inventories will change as of 2015 so that countries will start applying the 2006 IPCC Guidelines. This will require adapting NSOs' systems to the new guidelines in cooperation with GHG inventory producers. At the same time, the Common Reporting Format (CRF) tables used for the GHG inventories will also change slightly, merging for example the sectors 2 "Industrial Processes" and 3 "Solvents".

- Response: The recommendations mention the ongoing revision of the CRF categories and the expected move to applying the 2006 IPCC Guidelines. The Task Force will review the main challenges to NSOs, and replace all references to CRF tables to refer directly to the new version.

15. FAO would reduce the focus on energy emissions in the recommendation. Although in absolute terms emissions from fossil fuel energy sources dominate total GHG emissions globally and in developed countries, this is not the case in developing countries where a large component of emissions relate to agriculture, forestry and other land uses (AFOLU). Even in developed countries the largest data uncertainties and data gaps reside not in the energy sector, but rather in the other sectors, in particular in the AFOLU sector.

- Response: The specific focus on energy statistics is due to the following: energy is one of the most common sectors for which NSOs provide inventory data, inconsistencies between energy statistics and GHG inventory data have been identified, there is some concern about duplication of effort for these data and, as mentioned by FAO, emissions related to energy dominate total GHG emissions in many countries. In finalising the recommendations, the Task Force took steps to balance the recommendations concerning different sectors of inventory data. The

Task Force will revisit the issue of balance between the different inventory sectors throughout the recommendations.

16. FAO suggested stating more clearly that only Annex I countries have to report annually and are subject to international peer reviews, and that the recently agreed biennial update reporting and the Nationally Appropriate Mitigation Actions (NAMAs) processes add incentives to all countries to develop robust inventories.

- Response: The requirement for annual reporting for Annex I countries only is mentioned in Chapter 2, and will be repeated in Section 5.1. Inventory reviews are discussed in Sections 2.3, 2.4 and 5.1. A remark will be added to clarify that only Annex I countries are subject to these reviews. Biennial reporting is mentioned only once, and could be elaborated more. The recommendations do not refer to NAMAs. Instead they mention that national communications require reporting on other information than emissions and that providing those data may be considered as one of the priorities for NSOs. The Task Force will consider whether to include a specific reference to NAMAs and will consider the implication for NSOs.

17. Recommendation 1: Norway suggests reconsidering whether NSOs should bear the full responsibility of identifying and recommending data improvements or recommending how the national statistical system can be better utilized for GHG inventories. Norway notes that in recommendations 2 and 3 the NSO role focuses more on cooperation.

- Response: The intention of the recommendation is to emphasise partnerships and collaboration, and the role of the NSO as the coordinator of the national statistical system to initiate improvements and facilitate the work. The Task Force will review the wording of this recommendation, for example to revise the sentence "NSOs should take the initiative in improving quality of statistical data used for GHG inventories" to "NSOs should initiate collaboration to improve quality of statistical data used for GHG inventories".

18. Recommendation 2: The Netherlands stresses the fact that the European Statistical System Code of Practice explicitly considers both 'burden on respondents' and 'cost-effectiveness', whereas this is not the case in the guidelines for compiling GHG inventories. It should also be stressed that cost-effectiveness not only implies avoiding overlapping data reporting systems nationally, but also to reducing overlapping international data reporting systems.

- Response: The recommendations discuss these differences between the quality guidelines of official statistics and GHG inventories in Section 4.1. The Task Force will add a remark about this difference also to the recommendations in Section 5.1.

19. Recommendation 2: FAO notes that the relevant procedures specifying how to build robust national inventory systems are part of the IPCC guidelines. Thus, it could be mentioned that if NSOs are not part of the GHG inventory process, it is not due to missing processes at the global level or lack of guidelines from UNFCCC/IPCC.

- Response: The Task Force will reflect the issue in the recommendation in Section 5.1.

20. Recommendation 3: Finland finds that working with review teams does not as such enhance collaboration with the UNFCCC and IPCC. Instead, more direct channels of collaboration could be recommended for countries, e.g. contacts with the national IPCC focal points or the technical support unit of the IPCC Task Force on National Greenhouse Gas Inventories (IPCC TFI). Furthermore, the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP) could be a good body for NSOs to engage with. NSOs could also assist the national inventory producers during inventory reviews when questions on data availability and quality are raised.

- Response: NSOs' engagement in the UNFCCC and IPCC processes was discussed at the expert meeting on climate change related statistics for users and producers on 8-9 October 2013. The key findings were reflected in the recommendations, for example in Sections 2.4 and 4.1. The latter section mentions direct contacts with the national representatives. The Task Force is drafting a comprehensive description of the ways for NSOs' engagement in UNFCCC and IPCC processes together with the two organisations. The description would ideally be included as an Annex to the recommendations, or finalised in further work. The Task Force will reflect Finland's suggestions in the recommendations in Section 5.1.

B. Comments on recommendations on climate change related statistics (other than GHG inventories) (Section 5.2 of the recommendations)

21. Recommendation 4: Norway remarked that the report mainly talks about providing microdata for research purposes, but the text in this recommendation also refers to policy makers.

- Response: The recommendations intend to suggest improving access to microdata for researcher purposes. The work of researchers provides important input to policy makers and climate analysts. References to policy makers in this context will be removed from the recommendations.

22. Recommendation 5: Norway points out that evaluating all data of the national statistical system to improve them for climate change analysis may be too resource intensive.

- Response: The recommendations suggest "reviewing statistical programs and data collections from the view point of the data needs of climate change analysis." This could be implemented in different ways by countries, for example at the time of other periodic reviews or development projects of specific statistics. The reviews could also focus on areas of national priority. As climate change is a cross cutting issue, data needs relating to it may be directed at a number of statistical areas. The Task Force will revisit the wording of the recommendation in Section 5.2.

C. Comments on recommendations on statistical infrastructure (Section 5.3 of the recommendations)

23. Recommendation 7: Norway finds the recommendation to revise classifications burdensome, and notes that the classifications used in the System for National Accounts were not developed for the purpose of extracting information at the detailed level suggested.

- Response: The recommendations suggest giving consideration to the data needs related to climate change in future revisions of international statistical standards and classifications. The listed detailed issues for which improved classifications might provide data are examples to illustrate the idea. The Task Force will revisit the wording of the recommendation in Section 5.3.

24. Recommendation 8: Norway suggests asking NSOs instead of reading the guidelines for GHG inventories themselves, to focus on cooperation among the relevant institutions to acquire the required understanding.

- Response: The recommendations suggest familiarizing staff with GHG inventory methodologies to understand the logic behind the methodologies. The recommendation emphasises collaboration and partnerships as Norway suggests.

25. Recommendation 9: Germany underlines that tasks in support of climate change related statistics can be fulfilled within different organizational structures, and notes that it is not necessary that in all NSOs one person has the primary responsibility for ensuring the quality and availability of climate change related statistics. **Norway** suggests that improving cooperation between different units inside the NSO would also be recommended.

- Response: The recommendation states that assigning, as a first step, a person or group with the primary responsibility for climate change related statistics. The Task Force will replace the word "primary responsibility" with "responsibility" to indicate that it does not need to be the primary task. The Task Force will include a remark about the need to improve internal cooperation of the NSO.

D. General comments on the text of the recommendations

26. Eurostat: It could be made clearer that the target audience of the recommendations is not only NSOs but to a certain degree also national inventory producers and other stakeholders, especially international organisations.

- Response: The Task Force will reflect the comment in the recommendations.

27. FAO would like the recommendations to reflect its work on developing a FAOSTAT emissions database and implementing capacity development activities aimed at bridging institutional gaps between NSOs and UNFCCC focal points, as well as technical gaps. FAO has also engaged with relevant agencies in this area (IPCC and UNFCCC, UN ESCAP, UN REDD, UNDP, NSOs in many developing countries, and regional research agencies such as the JRC), and is willing to contribute to NSOs' efforts in this area.

- Response: The Task Force will reflect these comments in the recommendations.

28. Furthermore, a number of countries and organisations provided technical comments and clarifications directly into the report text (Canada, China, Netherlands, EEA, FAO, PRTR and WMO) that will be incorporated in the recommendations.

- Response: The technical comments on the report text will be incorporated during final editing.

VI. Conclusion

29. All responding countries and organisations supported the endorsement of the recommendations on climate change related statistics. Countries have plans for national implementation of the recommendations, and requested for international support.

30. All countries and organisations supported the establishment of a forum in the form of an expert meeting to discuss climate change related statistics. Several countries suggested the creation of a small Steering Group to lead the work.

31. The comments and views expressed during the electronic consultation will provide a good basis for planning future work on climate change related statistics, which will be presented for a review to the CES Bureau in October 2014. The Secretariat will draft a proposal with the Task Force on climate change related statistics.

32. The technical comments on the text of the recommendations and the concrete comments presented above in section V of this paper will be reviewed by the Task Force and incorporated in the final version. The Task Force will also reflect the substantive comments, presented in other parts of this document, in the final version of the report.

33. In view of the wide support expressed by countries and organizations, the Conference is invited to endorse the recommendations on climate change related statistics, subject to reflecting in the recommendations the above comments of the CES consultation and the discussion at the Plenary Session.